
Environmental Assessment

NM 68 Rockfall Project – PCN 3941 MP 19.37-19.39 and MP 27.29-27.85 Rio Arriba and Taos Counties, New Mexico



Federal Highway Administration – New Mexico Division

Bureau of Land Management – Taos Field Office

New Mexico Department of Transportation – District V

March 2005

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Federal Highway Administration (FHWA) - New Mexico Division

Bureau of Land Management (BLM)

New Mexico Department of Transportation (NMDOT)

Submitted pursuant to 42 U.S.C 4332(2) (c)

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FHWA Division Administrator

Date

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BUREAU OF LAND MANAGEMENT

PRELIMINARY

DECISION RECORD
AND
FINDING OF NO SIGNIFICANT IMPACT

Proposal: New Mexico Department of Transportation is proposing to install rockfall protection systems which includes; fences, wire slope mesh, and concrete wall barriers within their existing right of way. They are also proposing to use two detour routes near milepost 27 along NM Highway 68 and a temporary storage area immediately southeast of Pilar.

Need and Purpose of Proposal:

The purpose of amending the right-of-way (to allow installation of a rockfall protection system) would be to improve the safety conditions on NM 68 by reducing the quantity of rocks falling on the roadway, thereby limiting the number of potential traffic accidents.

The area encompassing the right-of-way is managed by the Taos Field Office of the Bureau of Land Management. The proposed re-construction area is located within Sections 5 and 6, Township 23 North, Range 11 East and Section 32, Township 24 North, Range 11 East.

Decision to be Made: The main decision to be made is; whether or not BLM will amend the New Mexico Department of Transportation (NMDOT) existing right of way to allow for installation of rockfall protection systems and if so under what terms and conditions; and whether or not to authorize temporary work areas. Also, what level of safety measures should be allowed that will adequately improve safety and conform to current management objectives for visual resources. An environmental assessment has been prepared and there are five alternatives (including the No Action alternative) outlined in Chapter Three; the decision will be to select one of the five alternatives.

Public Involvement and this Preliminary Decision Record and FONSI:

Public involvement included five meetings to present the proposal and discuss issues. Three stakeholder meetings were held, two in Pilar and one in Taos. These were set up for smaller groups of people with direct interest in the project. Two public meetings, with a more detailed presentation of the project and an open house, were also held in Taos. Public meetings were advertised in local newspapers of Taos, Española, and Albuquerque. Announcements of meetings were also mailed and displayed on electronic highway message boards located along NM Highway 68. One radio interview was conducted in Taos.

Preliminary Finding of No Significant Impacts: Based on the analysis, I have determined that impacts are not expected to be significant and an environmental impact statement is not required.

Preliminary Decision: It is my decision to select Alternative A-1 for the above referenced NMDOT safety installation activities. In brief, the project area includes 2,943' of BLM land along NM Highway 68 between milepost 27.29 and 27.85. Rockfall protection devices would include a combination of wire slope mesh, rockfall fence and concrete wall barriers. In addition, the rockfall fence height and location would be adjusted slightly in the field to minimize skylining. Alternative A-1 would attempt to reduce skylining by 80% at KOP 2 from Alternative A and reduce skylining by 20% at KOP 5.

These activities and their impacts are fully described in the Environmental Assessment entitled; NM 68 Rockfall EA, PCN 3941. A map is attached showing the project area.

Analysis determined that the following stipulations would be required:

- NMDOT will coordinate with BLM staff during the “in-the-field” placement of rockfall fence to reduce ‘skylining’ throughout the project area. Skylining occurs when a man-made structure is visible on the horizon, creating a contrast with the existing landform.
- The rockfall fence will be located to reduce skylining from Key Observation Point (KOP) 2 and at KOP 5 (improvement over Alternative A) where people stop to enjoy views. A 6-foot fence, rather than an 8-foot fence will be constructed near KOP 5.
- NMDOT will obtain BLM approval on color for concrete wall barriers to blend with existing colors in the landscape.

Rationale for the Decision: The decision to authorize the above referenced right of way amendment and subsequent re-construction activities within the project area is consistent with the Taos Resource Management Plan (1988). Additional guidance was also provided by the Rio Grande Corridor Final Plan (2000). Further:

- The major resource issues as identified in the EA and project record have been adequately analyzed and considered and no significant impacts to those resources will occur as a result of this decision.

However, skylining would be in conflict with existing visual management objectives. Although attempts will be made to minimize skylining by adjusting the placement and height of the fence, skylining may not be eliminated. Therefore, I have selected an alternative that provides the greatest protection for the safety of motorists yet puts in place limits that attempt to meet the visual objectives outlined in the Rio Grande Corridor Plan.

- There are no adverse impacts to threatened or endangered plant or animal species or cultural resources.

_____ Sam DesGeorges, Field Office Manager _____ Date

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ACRONYMS AND ABBREVIATIONS

ACEC:	Area of Critical Environmental Concern
AD 236	Administrative Directive 236
BLM:	Bureau of Land Management
BMPs:	best management practices
C:	candidate species
CEQ:	Council on Environmental Quality
CERCLA:	Comprehensive Environmental Response Compensation and Liability Act
CFR:	Code of Federal Regulations
cfs:	cubic feet per second
CME:	construction maintenance easement
CO:	carbon monoxide
CP 86:	Commission Policy 86
dBA:	A-weighted decibel
E:	endangered
EA:	environmental assessment
°F:	degrees Fahrenheit
FHWA:	Federal Highway Administration
FLPMA:	Federal Land Policy and Management Act of 1976
FONSI:	Finding of No Significant Impact
g:	grams
ISA:	Initial Site Assessment
Leq _(dBA) :	A-weighted equivalent sound level
m ³	cubic meters
µg:	micrograms
MP:	milepost
mph:	miles per hour
NAAQS:	National Ambient Air Quality Standards
NAICS:	North American Industrial Classification System
NEPA:	National Environmental Policy Act
NM 68:	New Mexico State Highway 68
NMDGF:	New Mexico Department of Game and Fish
NMDOT:	New Mexico Department of Transportation
NO ₂ :	nitrogen dioxide
NOI:	Notice of Intent
NOT:	Notice of Termination
NPDES:	National Pollutant Discharge Elimination System
NRHP:	National Register of Historic Places
O ₃ :	ozone
Pb:	lead
PM 10	particulate matter
ppm:	parts per million
RMP:	Resource Management Plan
ROS:	Resource Opportunity Spectrum
S:	BLM and NMDOT special status species
SOC:	species of concern
SHPO:	State Historic Preservation Officer

SO ₂ :	sulfur dioxide
SRCP:	State Register of Cultural Properties
STIP:	State Transportation Improvement Program
SWPPP:	Storm Water Pollution Prevention Plan
T:	threatened species
TCP:	temporary construction permit
TESCP:	Temporary Erosion and Sediment Control Plan
US 64:	U.S. Highway 64
US 84/285:	U.S. Highways 84 and 285
USC:	U.S. Code
USEPA:	U.S. Environmental Protection Agency
USFWS:	U.S. Fish and Wildlife Service
VRM:	Visual Resource Management

1.0 Summary of Environmental Assessment

This summary provides a brief description of the environmental assessment (EA) process and generally describes the proposed project. The need for the project is also summarized, as are the potential impacts and appropriate mitigation measures to the natural and human environments that would result from implementation of the proposed action. This section also provides an overview of the public involvement and agency coordination efforts.

1.1 Introduction to Project and Process

The New Mexico Department of Transportation (NMDOT) in cooperation with the Bureau of Land Management (BLM) and the Federal Highway Administration (FHWA) are preparing alternative proposals and environmental analysis for installation of rockfall protection systems along NM 68 between Velarde and Pilar in Rio Arriba and Taos counties, New Mexico.

This environmental document has been prepared in accordance with BLM regulations and guidelines under the Federal Land Policy and Management Act of 1976 (FLPMA), *BLM NEPA Handbook, Rio Grande Corridor Final Plan* (BLM, 2000), *Taos Resource Management Plan* (BLM, 1988), NMDOT guidelines, FHWA Technical Advisory T 6640.8A, FHWA regulations at 23 Code of Federal Regulations (CFR) Parts 771 and 772, and other applicable laws, regulations and guidelines. The EA addresses purpose and need (Section 2.0), analysis of alternatives including the no-build alternative (Section 3.0), impacts to the natural and human environment and appropriate mitigation measures (Section 4.0), and environmental commitments (Section 5.0), and public involvement and agency coordination (Section 6.0). The EA was prepared by the BLM, FHWA, NMDOT, and Marron and Associates under contract to NMDOT. The EA evaluates three build (action) alternatives and a no build (no action) alternative.

The EA was prepared in coordination with federal, state, and local agencies. The EA implements the intent of the National Environmental Policy Act (NEPA). The EA also documents the need to prepare an environmental impact statement (EIS) if significant environmental impacts are identified. The analysis process serves to inform the public and elected officials of the consequences of the proposed action and all alternatives to that action and consider public input. The EA serves as a basis for making a decision and used in the development of decision-making documents by the BLM and FHWA.

The preliminary engineering and environmental investigations conducted thus far for this project have not disclosed any significant impacts on the quality of the natural or human environment. The project is currently listed in the State Transportation Improvement Program (STIP). Construction is proposed to occur by roadway segments. Once a draft EA has been approved by the BLM and an EA for public circulation has been approved for circulation by the FHWA, a public hearing will be held. At the end of the 30-day comment period, a revised BLM EA will be prepared. If no significant environmental impacts are identified, a FONSI request will be prepared and submitted to BLM and FHWA. BLM and FHWA would then issue separate FONSI decisions meeting the requirements of their respective guiding agency legislation and regulations. The revised BLM EA, BLM decision record, and FHWA FONSI decision documentation will address any concerns raised during the circulation of the EA, during the public hearing comment period, or regarding coordination of other aspects of the project with appropriate agencies. It is anticipated that the FHWA FONSI and BLM decision documentation will authorize final design of the NM 68 Rockfall Project. NMDOT has budgeted \$1.2 million of FHWA Hazard Elimination Funds for this project. The project will receive federal and 20% state funding.

After the EA has been approved for circulation by FHWA, a public hearing will be held. If no significant environmental impacts are identified, a finding of no significant impact (FONSI) will be prepared and distributed. The FONSI will address any concerns raised during the circulation of the EA, during the public hearing comment period, or regarding coordination or other aspects of the project with appropriate agencies. Based on comments received, environmental commitments will be revised as needed and included in the FONSI.

1.2 Project Corridor – Summary

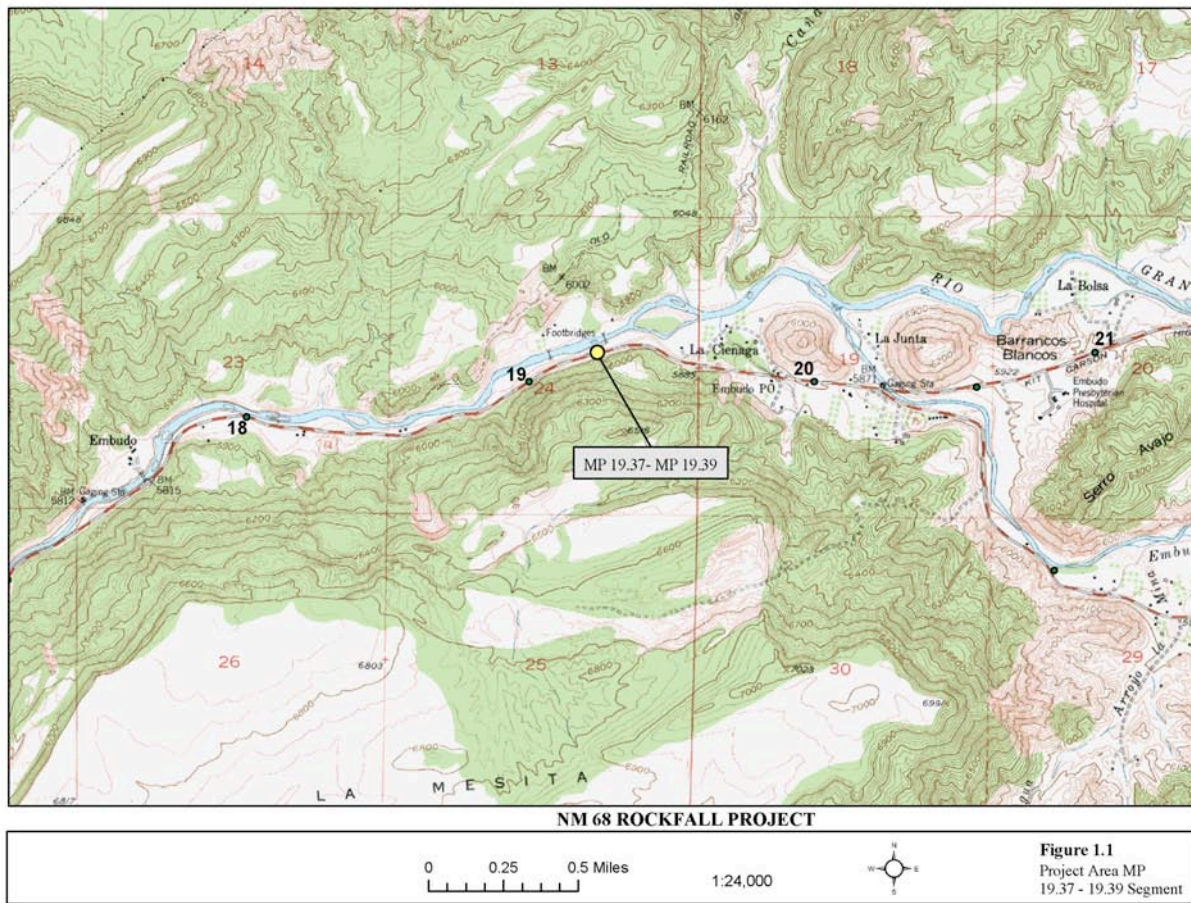
NM 68 is the main roadway connection between Española and Taos, New Mexico. NM 68 begins at the US 84/285 intersection in Española and continues north to Taos, where the roadway ends at the US 64 intersection. The road serves as a link between central New Mexico cities, such as Albuquerque and Santa Fe, and northern New Mexico communities such as Angel Fire, Questa, and Red River. Travelers include tourists, commercial vehicles, and daily commuters between Taos and employment centers in Española, Los Alamos, and Santa Fe. Local travelers reside in the gorge communities of Dixon, Embudo, Pilar, Rinconada, and dispersed residences in the area. River rafting launching and landing areas, scenic overlooks, campgrounds along NM 570, and the BLM Rio Grande Gorge Visitor Center at Pilar are important destinations for tourists (see Figures 1.1, 1.2, and 1.3).

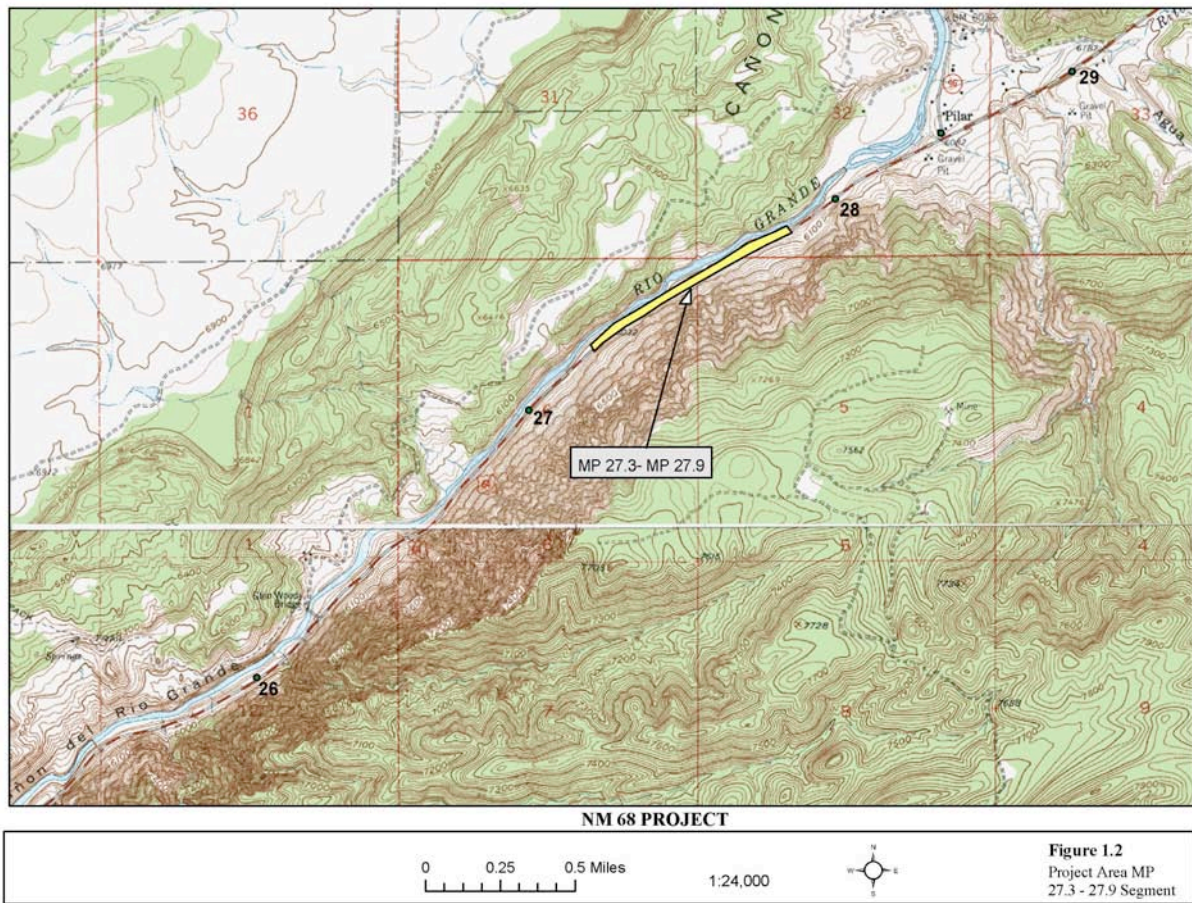
Within the gorge, NM 68 is a two-lane undivided roadway with numerous curves and areas with limited sight distance. A passing lane is located along a segment of NM 68 north of Pilar. NM 68 is a 4-lane facility at Española and remains a 4-lane facility until Velarde where it becomes a 2-lane facility. North of Velarde, NM 68 is a 2-lane facility until it enters Taos, where it is a 4-lane facility. The posted speed limit in the gorge is 55 miles per hour (mph), but is reduced to 45 mph at Pilar. NM 68 has steady traffic volumes especially during daytime and evening hours. More traffic data is presented in Section 2.2. Late spring, summer, and fall traffic tend to be higher than winter and early spring traffic.

In response to several crashes and fatalities along NM 68 caused by falling rocks, NMDOT installed rockfall protection systems along several segments of NM 68 between Velarde and Pilar in the early 1990s. Rockfall protection systems measures used include recontouring slopes, concrete wall barriers, excavation of a catchment area behind a berm, and use of wire rope net rock retaining system.

1.3 Project Purpose and Need – Summary

Continuing safety issues indicate a need for additional rockfall systems along NM 68. Rocks continue to fall on NM 68 along unprotected segments between Velarde and Pilar. This creates a safety concern for the traveling public. NMDOT rated this project as number one priority for safety improvement in NMDOT District V and in the top 10% of needed safety projects in New Mexico. Rocks have caused fatalities, vehicle damage, and property damage. The NMDOT patrol foreman identified this segment of NM 68 as the worst for removal of debris. The purpose of the NM 68 rockfall project is to improve the safety conditions on NM 68 by reducing the quantity of rocks falling on the roadway.





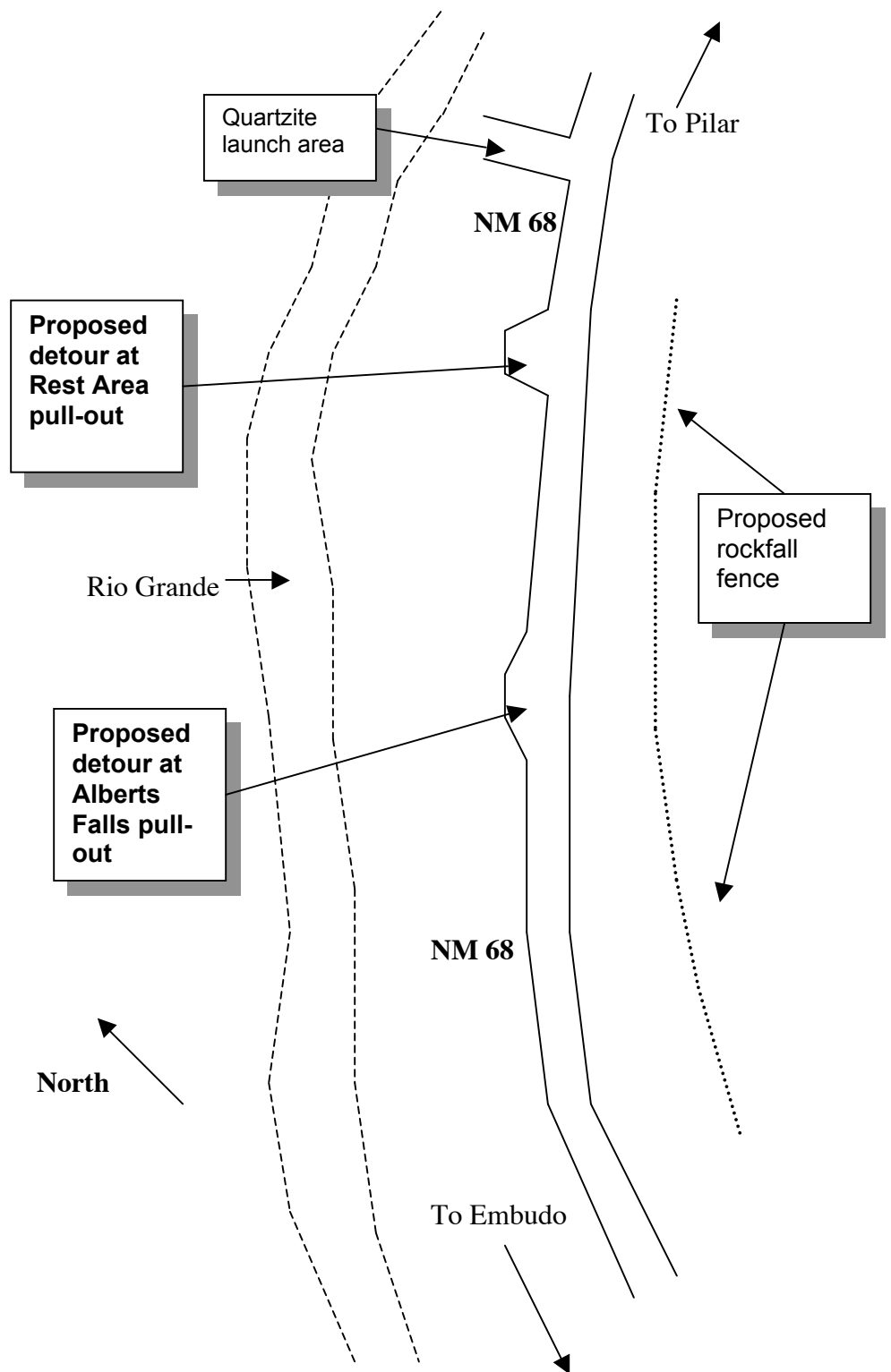


Figure 1.3 Proposed detours along MP 27.3-27.9 segment.

1.4 Project Description – Summary

NMDOT would construct rockfall protection systems consisting of rockfall fence, wire slope mesh, and/or concrete wall barrier at the following locations: MP 19.37-19.39 (120 linear feet) and MP 27.29-27.85 (2973 linear feet). The MP 27.29-27.85 segment of the rockfall system would have gaps in areas that do not require slope protection. The exact placement will be determined during final design.

1.5 Principal Issues Brought Forth Through Public Involvement

Public involvement was obtained through a series of public involvement events including:

- Public meetings held on July 20 and December 15, 2004; and
- Stakeholder meetings were held on August 25, September 29, and December 1, 2004.

The need to balance safety with protecting the visual integrity and ensuring continued recreational use of the Rio Grande Gorge, as well as Tourists visiting Taos, was a central issue during public involvement. Several stakeholders mentioned the importance of preventing rocks falling onto NM 68. A few stakeholders either witnessed or were involved in crashes caused by falling rocks. Stakeholders also recognize the importance of protecting the views and related resources values of the Rio Grande Gorge. The area receives many visitors who are sightseeing, fishing, river rafting, or just passing through to other destinations. Several stakeholders stressed the importance of using rust-colored posts, earth-colored concrete barriers, and other materials designed to blend with the landscape. Other issues identified by the public included:

- **Community and economic issues:** need to work with the Taos business community; consider impacts on summer rafters and tourists in the area; local fall arts and crafts festivals in Gorge communities; and consider impacts to travelers going to fall festivals in Taos. The business community is concerned that anticipated construction delays will cause visitors to change their plans and not visit local Gorge communities and Taos.
- **Effectiveness of rockfall systems:** rockfall is greatest during summer monsoons and spring thaws; evaluate cost effectiveness of rockfall systems; determine if fences are better than netting; and consider moving the roadway to another corridor.
- **Natural environment:** consider impacts to vegetation and trees; eventually may need to place rocks in the river to replace rocks captured by the rockfall system; and visual appearance of gorge is important.
- **Traffic safety:** unsafe driving is a problem along NM 68 due to the high speed of traffic on NM 68 and the lack of speed enforcement. Many crashes occur in Pilar, most because of speeding.

2.0 Project History, Purpose and Need

2.1 Project History

NM 68 between Velarde and Pilar occurs in a steep walled gorge of the Rio Grande. Rocks from the gorge wall on the east side of NM 68 regularly fall onto the roadway. Rocks can vary from small pebbles to large boulders, which can crush a car.

NM 68 has a long history of rock fall caused crashes. Most rockfall events occur during summer thunderstorms when water loosens rocks. Many rockfall events also occur during winter freezing and frosts. Long-term effects of wind, and water erosion along with changing temperature also result in occasional rockfalls. Falling rocks in the gorge come from the cut slope, above the cut slope, and from drainage basins (NMDOT, 1992). Rocks on the roadway create dangerous situations for both motorists, visitors at pull-off areas, and NMDOT maintenance workers. The most common danger occurs when a driver is surprised by a rock on the roadway and seeks to avoid the rock by driving around the rock or braking quickly. Sharp curves, high traffic speeds, and narrow shoulders limit the options for drivers to avoid rocks. Although less common, direct impact of falling rocks can be extremely dangerous if the rock is large enough to penetrate the vehicle and injure vehicle occupants.

In response to several crashes and fatalities along NM 68 caused by falling rocks, NMDOT installed rockfall protection systems along several segments of NM 68 between Velarde and Pilar in the early 1990s. Rockfall protection systems measures used include recontouring slopes, concrete wall barriers, excavation of a catchment area behind a berm, and use of wire rope net rock retaining system.

Minimizing impacts to visual resources and local economies (especially tourism) have been important considerations in the development of past rockfall projects and this project. Tourist-related activities, such as river rafting, depend on the visual characteristics gorge and river. Tourists also use NM 68 to reach local tourist destinations such as Taos and campgrounds along NM 570.

2.2 Existing Traffic Conditions

NM 68 is the main roadway connection between Española and Taos, New Mexico. NM 68 begins at the US 84/285 intersection in Española and continues north to Taos, where the roadway ends at the US 64 intersection. The road serves as a link between central New Mexico cities, such as Albuquerque and Santa Fe, and northern New Mexico communities such as Angel Fire, Questa, and Red River. Travelers include tourists, commercial vehicles, and daily commuters between Taos and employment centers in Española, Los Alamos, and Santa Fe. Local travelers reside in the gorge communities of Dixon, Embudo, Pilar, Riconado, and dispersed residences in the area. River rafting launching and landing areas, scenic overlooks, campgrounds along NM 570, and the BLM Rio Grande Gorge Visitor Center at Pilar are important destinations for tourists.

Within the gorge, NM 68 is a two-lane undivided roadway with numerous curves and areas with limited sight distance. A passing lane is located along a segment of NM 68 north of Pilar. NM 68 becomes a 4-lane facility at Velarde and remains 4-lane through the intersection with US 84/285 in Española. North of the gorge, NM 68 is a 2-lane facility until it enters Taos, where it is a 4-lane facility. The posted speed limit in the gorge is 55 miles per hour (mph), but is reduced to 45 mph at Pilar. NM 68 has steady traffic volumes especially during daytime and evening hours. Late spring, summer, and fall traffic tend to be higher than winter and early spring traffic. Average daily traffic volumes were 4218 vehicles per day in year 2000 and 4568 vehicles per day in year 2001 (NMDOT, 2005).

2.3 Existing Safety Conditions

NM through the Rio Grande Gorge has a long history of rockfall incidents. Twenty-eight crashes involving falling rocks were recorded from 1984 to 1986 (NMDOT, 1992). In September 1988, the danger that falling rocks pose was brought to the public's attention, when a falling rock near Embudo hit a bus and killed six individuals and injured 14 others (Griffith and Roybal, 1988). As a result, NMDOT installed rockfall protection systems measures including recontouring slopes, concrete wall barriers, excavation of a catchment area behind a berm, and use of wire rope net rock retaining system.

Since the installation of rockfall protection systems in the early 1990s, crashes involving rocks have been reduced. However, rocks continue to fall on the roadway in areas where rockfall protection systems are lacking. From 1998 through 2003, 234 crashes occurred along NM 68 in the gorge. Thirty-six of the crashes were rockfall related (see Table 2.1). Rock related crashes represented 15% of the total crashes during the period. The MP 27.3-27.9 segment of NM 68 through the gorge has had a high incidence of falling rock related crashes. NMDOT rates the NM 68 Rockfall Project as the number one priority safety project in the NMDOT District V (based on the safety / benefit ratio) of 22 rockfall problem areas in north-central and northwestern New Mexico.

Table 2.1 NM 68 – Number of Crash Occurrences

Year	Rock Related Crashes	Property Damage Crashes	Personal Injury Crashes	Fatal Crashes	Total Crashes	Percent Rock Related
1998	7	7	0	0	39	18%
1999	1	1	0	0	28	4%
2000	4	4	0	0	41	10%
2001	13	12	1	0	52	25%
2002	5	4	1	0	33	15%
2003	6	5	1	0	41	15%
Totals	36	33	3	0	234	15%

Source: NMDOT crash data

During public and stakeholder meetings conducted for this EA, the public was aware of the need to balance safety with protecting the visual integrity and ensuring continued recreational use of the Rio Grande Gorge was a central issue during public involvement. Several stakeholders mentioned the importance of preventing rocks falling onto NM 68. The New Mexico State Police wrote a letter in support of the project (see Appendix A). A few stakeholders either witnessed or were involved in crashes caused by falling rocks. Of written comments received, preventing rockfall crashes was the principal concern:

- Six written comments supported the project and emphasized the need to prevent rockfall crashes and improve safety along NM 68;
- Four written comments mentioned that visual resources and recreation use of the Rio Grande Gorge are important values to be considered in project planning;

- Three written comments mentioned witnessing rockfall related crashes on NM 68; and
- Three written comments mentioned the need to maintain traffic flow during construction since many commuters and visitors travel along NM 68. This is an important issue for the Taos business community because they have many weekend festivals during the fall.

Stakeholders also recognize the importance of protecting the views and related resources values of the Rio Grande Gorge. The area receives many visitors who are sightseeing, fishing, river rafting, or just passing through to other destinations. Several stakeholders stressed the importance of using rust-colored posts, earth-colored concrete barriers, and other materials designed to blend with the landscape.

2.4 Project Purpose and Need

Continuing safety issues indicate a need for additional rockfall systems along NM 68. Rocks continue to fall on NM 68 along the segment between Velarde and Pilar. As described in Section 2.3, rockfall related crashes are a key safety issue along NM 68. This creates a safety concern for the traveling public. NMDOT rated this project as number one priority for safety improvement in NMDOT District V and in the top 10% of needed safety projects in New Mexico. Rocks have caused fatalities, vehicle damage, and property damage. The NMDOT patrol foreman identified this segment of NM 68 as the worst for removal of debris.

The needed rockfall system should meet the following criteria:

- Capable of absorbing impact loads of up to 20 foot-tons of kinetic energy – this is roughly equivalent to a small car falling down the slope;
- Require minimal maintenance;
- Catch and hold rocks until maintenance can be performed;
- Colored with corrosion and ultraviolet resistant paint that minimizes visual impact;
- Constructed with light-weight components; and
- Minimal environmental impact and cost.

The purpose of the NM 68 rockfall project is to improve the safety conditions on NM 68 by reducing the quantity of rocks falling on the roadway. NMDOT has budgeted \$1.2 million of FHWA Hazard Elimination Funds for this project. The proposed action is in compliance with the *Rio Grande Corridor Final Plan* (BLM, 2000) in that the proposed action would be an amendment to the existing right-of-way, not a new right-of-way.

3.0 Alternatives Considered

3.1 Alternatives Considered but Eliminated from Further Consideration

Several alternatives were considered but eliminated from further consideration. Routes other than existing alignment along the east side of the river within the gorge were considered. One possible alternative would place the alignment along the west side of the river within the gorge. This alternative would place the road away from the risk of rockfall, but it would have significant environmental impacts (especially to visual resources, soils, vegetation, and wildlife) and require substantial right-of-way acquisition. Another alternative is to consider a new upland alignment away from the gorge. This would require an analysis of several alignment options, evaluation of environmental impacts, and right-of-way acquisition. A corridor study is proposed in the future, but it will not resolve existing problems along the NM 68 corridor. An alternative route may not prove feasible because of significant environmental impacts and the substantial right-of-way acquisition involved. In addition, funding is not currently available for an alignment along the west side of the river or an upland alignment away from the gorge, but this will be evaluated in a future NMDOT corridor study.

Another construction-intensive alternative was also considered. A rock shelter could be constructed above NM 68. The shelter would provide 100% protection from falling rocks. This alternative was eliminated from consideration for this project and will be assessed in a future corridor study.

3.2 No-Build Alternative (No Action)

Under the No-build alternative, no additional rockfall protection systems would be constructed. No fences, wire mesh, or concrete wall barriers would be constructed at the following locations: MP 19.37-19.39 (120 linear feet) and MP 27.29-27.85 (2973 linear feet). Rocks would continue to fall on the roadway at these locations. Safety concerns for travelers along NM 68 would continue. Temporary disturbance from maintenance would affect 2.0 acres.

3.3 Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

NMDOT would construct an 8-foot high rock fall fence and install wire slope mesh below the fence to the southeast of NM 68. The fence would catch rock coming from high up the slope at great speeds and rocks falling as a result of slope erosion. The wire slope mesh, which is separate from the fence, would contain rocks on the slope between the fence and the roadway. A flat bottom ditch would be constructed to catch rocks falling from slopes near the roadway. Alternative A would be constructed at the following locations: MP 19.37-19.39 (120 linear feet) and MP 27.29-27.85 (2973 linear feet). The MP 27.29-27.85 segment of the rockfall system would have gaps in areas that do not require slope protection. The exact placement will be determined during final design. The concrete wall barrier would be placed in front of some portions of the flat bottom ditch in order to contain the rocks, but the concrete wall barrier would not be continuous along the project area segments.

The rockfall fence and wire slope mesh would be constructed of standard components to the extent possible and would require minimal maintenance when subjected to infrequent rockfall events. The fence and slope mesh would be resistant to corrosion, ultraviolet sunlight degradation, and thermal deterioration. The fence and mesh would be constructed of relatively light-weight components and would be compact in order to minimize transportation costs and construction/installation time.

The rockfall fence consists of wire rope net suspended between 8-foot tall posts, spaced about every 25-feet. The rockfall fence would be capable of absorbing impact loadings of up to 20 foot tons of kinetic energy, which corresponds to a 2.3-foot diameter particle having a unit density of 165 pounds/cubic foot impact the net system at a speed of 50 feet per second. The rockfall fence would have the structural capacity to absorb the specified impact loads without passage of the rock through the barrier. The wire mesh on the fence would consist of an 8-inch by 8-inch square mesh using a 1/4-inch diameter mesh rope. It would have a minimum breaking strength of 4838 pounds. The 5/16-inch perimeter rope would have a minimum breaking strength of 8690 pounds. To assure maximum strength, the net would be diagonally woven. The wire rope would be looped around the border and secured at each point with a heavy-duty aluminum stop sleeve. Nets would be covered with link mesh fencing fabric to prevent particles smaller than 8 inches in diameter from penetrating the barrier. Net supporting and retaining ropes would be 5/8-inch diameter and have a braking element. The ropes will have a minimum breaking strength of 37,632 pounds. Posts would be supported with base plates, wire ropes, and anchors. The anchors would have minimum pull-out strengths of 15 tons. All wire rope connections would use wire rope thimbles where wire is looped.

The wire slope mesh placed across the slope would be similar to wire rope net used with the fence. Mesh would consist of 9 gage galvanized wire woven into approximately a 2 inch by 2 inch diamond pattern. The slope mesh would be secured to a tension cable (1/2 inch diameter zinc coated steel) with galvanized steel rings spaced at 0.5-foot intervals. The fabric would not be tensioned in any direction but would remain loose to increase the mesh's effectiveness in capturing rolling rocks. The mesh would not be fastened to the posts (except end posts) or any other part of the fence. Rolls of slope mesh would be joined by weaving a single strand into the ends of the roles to form a continuous mesh.

The concrete wall barrier is included in all three alternatives. The concrete wall barrier would be approximately 3-feet tall and painted to match the surrounding terrain. The wall barrier would be prefabricated. Removable sections would be provided for maintenance to allow rocks to be removed from behind the barrier. Alternatives A and A-1 would have an intermittent, painted concrete wall barrier placed at two locations. The wall barrier will be the temporary type with sections that can be removed when damaged. Alternatives B and C will have continuous wall barriers throughout the project area. The color will be determined by the BLM during construction. On option for having poured in place barriers was considered but eliminated from further consideration. The poured in place barrier would be difficult to maintain without removable sections, and it would have reflectorised attenuators at the end of poured sections. The yellow and black colored attenuators would be visually intrusive and were not considered acceptable for this project.

The rockfall systems under Alternative A and the other alternatives would require occasional maintenance. Non-explosive methods, such as use of Bristar compound, would be used to break down rocks. Rocks would be removed by using cranes with shovels that can reach from the vehicles parked along NM 68. When rocks and cranes are unable to reach rocks from the roadway, the rocks would be removed by hand. Rock debris would be stockpile at NMDOT maintenance yards for use on other projects.

During construction for Alternative A (as well as Alternatives A-1, B and C), detour areas would be constructed at pull-outs along the MP 27.29-27.85 segment at Albert's Falls and Roadside Rest Area. One-lane would be paved at the pull-outs for the detour at existing unpaved areas at the pull-outs. The detour area at the Roadside Rest Area will remain paved after the completion of construction and serve as permanent pull-out areas for Rio Grande Gorge visitors. After construction, asphalt will be removed at the Albert's Falls pull-out, and disturbed areas will be scarified and revegetated with native species.

Temporary disturbance from maintenance activities would affect 1.5 acres under Alternatives A, B, and C.

3.4 Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Alternative A-1 was developed in response to visual skylining (where the fence appears above the horizon with a sky background) of the fence. The skylining was especially visible from two pull-outs along the NM 68. It was determined that Alternative A (as well as Alternative B) would not meet the BLM Visual Resource Management (VRM) objectives. In response, BLM and NMDOT developed a visually modified Alternative A with reduced skylining. The alternative would include the following environmental commitment.

During construction, NMDOT and BLM will coordinate regarding the placement of rockfall fence to reduce skylining. The rockfall fence will be located to reduce skylining by 80% from Key Observation Points (KOP) 2 and by 50% at KOP 5 (improvement over Alternative A, see visual simulations in Appendix B) where people stop to enjoy views. No skylining occurs at KOP 4 under Alternatives A or A-1. Skylining will be reduced by 20% along the remainder of the project area where the views are observed by individuals in moving vehicles. During construction, the option of reducing the fence height from 8-feet to 6-feet will be evaluated to reduce visual impacts. The 6-foot high fence would be subject to approval by an NMDOT Geotechnical Designer under the condition that it will not compromise safety. In most instances, the fence would be located downslope below the horizon. Field verification for skylining will include having workers stand on the ridge with survey poles to verify fence height/location and make adjustments. NMDOT will use colored concrete on the wall barrier. The barrier will be colored tan or brown to blend with the landscape.

Alternative A-1 would be constructed identical to Alternative A in all aspects except for visual modifications. Alternative A-1 is the recommended preferred alternative.

3.5 Alternative B – Rockfall Fence with Concrete Wall Barrier

NMDOT would construct an 8-foot high rockfall fence. The fence would catch rocks coming from high up the slope at great speeds and rocks falling as a result of slope erosion. A concrete wall barrier would be installed to catch rocks that are dislodged by erosion from the slope between the fence and the roadway. This alternative would have concrete wall barrier the entire length of the project area. Regular maintenance would be required to remove accumulated rocks from behind the wall barrier. A flat bottom ditch would be constructed to catch rocks falling from slopes near the roadway. Alternative B would be constructed at the following locations: MP 19.37-19.39 (120 linear feet) and MP 27.29-27.85 (2973 linear feet). The MP 27.29-27.85 segment of the rockfall system would have gaps in areas that do not require slope protection. The exact placement will be determined during final design. Alternative B does not include slope mesh. The rockfall fence and concrete wall barrier would have the same design as Alternative A.

3.6 Alternative C – Concrete Wall Barrier

NMDOT would install a concrete wall barrier on the southeast side of NM 68 to catch some of the rocks coming from high up the slope at great speeds and rocks that are dislodged by erosion on the lower slopes nearer to the roadway. Some of the rocks coming from high up the slope at greater speeds would miss the wall barrier entirely and may reach the roadway. As with Alternative B, the concrete wall barrier would

be placed the entire length of the project. Regular maintenance would be required to remove accumulated rocks from behind the wall barrier. On rare occasions, extremely large rocks may break the concrete wall barrier. A flat bottom ditch would be constructed to catch rocks falling from slopes near the roadway. Alternative C would be constructed at the following locations: MP 19.37-19.39 (120 linear feet) and MP 27.29-27.85 (2973 linear feet). The MP 27.29-27.85 segment of the rockfall system would have gaps in areas that do not require slope protection. The exact placement will be determined during final design. Alternative C does not include the rock fall fence or slope mesh. The concrete wall barrier would have the same design as Alternatives A and B.

3.7 Comparison of Impact Areas

Table 3.1 shows the estimated impact areas for alternatives. The width of disturbance is 350 feet for Alternatives A and B, and 50 feet for Alternative C. Alternatives A and B have the largest disturbance area of 29.35 acres. Of the build alternatives, Alternative C has the smallest disturbance area of 8.05 acres. Much of this area has been previously disturbed by roadway construction and rockfall debris. Alternative A offers the most protection from rockfall events because the alternative includes three ways to stop rocks: fence, slope mesh, and concrete barrier. However, this makes Alternative A the most visible of the three alternatives.

The effectiveness of rockfall systems varies under the different alternatives. Under the No Build Alternative, without a rockfall protection system, most falling rocks land on the roadway. Large rocks would be unrestrained to inflict maximum damage to the traveling public. A rockslide may cover the roadway completely, restricting traffic movement. Under Alternative A with three rockfall protection devices, very large rocks exceeding the limits of design may occasionally breach through the fence, and the intermittent concrete wall barrier. Under Alternative B with two rockfall protection devices, very large rocks exceeding the limits of design may occasionally breach through the fence and continuous concrete wall barrier; rocks can also occasionally become dislodged from lower slopes and may in some instances breach the barrier. Under Alternative C with one rockfall protection device, the continuous concrete barrier wall will capture slowly rolling rocks, but rapidly rolling rocks, especially from upslope areas may breach the barrier and land on the roadway. A rockslide may overcome the barrier wall and cover the roadway completely, restricting traffic movement.

Visual resource impacts are an important issue for comparison of alternatives. The No Build Alternative will result in no change to the visual character of the gorge. Alternative A with fence, mesh, and barrier results in the most visual modification of the action alternatives. Alternative A-1 has a fence located below the horizon, which greatly reduces visual impacts. Alternative B with fence and barrier results in visual modification but to a lesser extent than Alternative A, which includes the slope mesh. Alternative C results in visual modification near the roadway, but no visual modification occurs upslope from roadway. For long-term recreation use, the alternatives are not expected to affect rafting, fishing, wildlife watching, camping, and enjoyment of views.

Table 3.1 Summary Comparison of Effects of Each Alternative

Issue or Resource	No Build Alternative (No Action)	Alternative A – Rockfall Fence with Slope Mesh and Concrete Barrier	Alternative A-1 - Visually Modified Rockfall Fence with Slope Mesh and Concrete Barrier	Alternative B – Rockfall Fence with Concrete Barrier	Alternative C – Concrete Barrier
Description	No additional rockfall systems installed, maintenance continues on existing rockfall systems along NM 68, and rocks removed from roadway.	8-foot high rockfall fence, wire slope mesh below fence, and an intermittent, 3-foot tall, concrete wall barrier in front of a flat bottom ditch.	8-foot high rockfall fence with adjusted location to reduce skylining of views. Wire slope mesh below fence, and an intermittent, 3-foot tall, concrete wall barrier will be placed in front of a flat bottom ditch.	8-foot high rockfall fence, and a continuous, 3-foot tall, concrete wall barrier in front of a flat bottom ditch.	A continuous, 3-foot tall, concrete wall barrier in front of a flat bottom ditch.
Construction Cost	--	\$1,200,000		\$1,000,000	\$300,000
Annual Maintenance Cost	\$50,000	\$10,000		\$15,000	\$25,000
Project Length	--	3093 feet* Alternative A-1 may be slightly shorter in length but that will be determined during construction			3093 feet
Project Width	--	350 feet			50 feet
Area of Permanent Disturbance	--	24.85 acres			3.55 acres
Disturbance at Two Pull-outs at Roadside Rest Area and Albert's Falls Rest Area.	--	3.0 acres			3.0 acres
Temporary Disturbance from Maintenance	2.0 acres	1.5 acre			1.5 acre
Total Disturbance	2.0 acres on NMDOT ROW	29.35 acres: - 23.89 acres on BLM public land - 0.96 acres on private land - 4.5 acres on NMDOT ROW			8.05 acres - 3.41 acres on BLM public land - 0.14 acres on private land - 4.5 acres on NMDOT ROW

Construction Duration	0 months	3 months			2 months
Safety	Rocks would continue to fall in the project area. Rocks falling from above the cut slope would be reduced by 0%, and rocks falling out of the cut slope would be reduced by 0%. Safety concerns of highway users would continue in the project area. NMDOT could be held liable for not implementing measures to reduce rockfall crashes along NM 68.	Placement of the three safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the highway by approximately 90%. The slope mesh and concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 99%. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.	Placement of the three safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the highway by approximately 85-90%. A 6-foot fence will be considered near KOP 5, but subject to approval by an NMDOT geotechnical designer. The slope mesh and concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 99%. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.	Placement of the two safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the cut slope by approximately 90%. The concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 80% initially and decrease with time as the concrete wall barrier deteriorates from rockfall impacts. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.	Placement of one safety device would reduce somewhat the rocks reaching the roadway. Rocks falling from above the cut slope would be reduced by 0%. The concrete wall barrier would reduce rocks falling out of the cut slope by approximately 80% initially and decrease with time as the barrier wall deteriorates from rock fall impacts. Maintenance to remove rocks from behind the wall barrier and replace damaged wall barrier sections would increase compared to Alternative A. Highway user confidence in the project area would NOT increase substantially with the appearance of the safety devices.

Maintenance Activities	Regular and frequent maintenance would be needed to remove rocks from the roadway.	Alternative A has the least level of maintenance needed to remove rocks from roadway. Periodic maintenance of rockfall protection devices would be needed.	Periodic maintenance of rockfall protection devices would be needed. Maintenance to remove rocks from behind the wall barrier and replace damaged wall barrier sections would increase compared to Alternative A.	Regular maintenance would be needed to remove rocks from the roadway and repair the concrete wall barrier. Maintenance to remove rocks from behind the wall barrier and replace damaged wall barrier sections would increase compared to Alternative A.
Rockfall Protection Analysis	No safety devices used: rocks falling from upper and lower slopes either fall onto the roadway shoulder or bounce onto roadway; rocks are removed by maintenance workers.	Three safety devices used: (1) fence captures rocks falling from upper slope, (2) slope mesh holds rocks on lower slope, and (3) intermittent concrete barrier retains fallen rocks until removed by maintenance workers.	Two safety devices used: (1) fence captures rocks falling from upper slope and (2) continuous concrete barrier retains fallen rocks until removed by maintenance workers.	One safety device used: (1) falling rocks, primarily lower slopes, are retained by the continuous concrete wall barrier until removed by maintenance workers.
Consequences Related to Alternative – Disadvantages	Without a rockfall protection system, most falling rocks land on the roadway. Large rocks would be unrestrained to inflict maximum damage to the traveling public. A rockslide may cover the roadway completely, restricting traffic movement.	Very large rocks exceeding the limits of design may occasionally breach through the fence, and the intermittent concrete wall barrier.	Very large rocks exceeding the limits of design may occasionally breach through the fence and continuous concrete wall barrier; rocks can also occasionally become dislodged from lower slopes and may in some instances breach the barrier.	The continuous concrete barrier wall will capture slowly rolling rocks, but rapidly rolling rocks, especially from upslope areas may breach the barrier and land on the roadway. A rockslide may overcome the barrier wall and cover the roadway completely, restricting traffic movement.
Community Construction Impacts	None	Embudo and Pilar residents affected by construction detours and noise, local commuters delayed by construction.		
Community Long-term Impacts	Local residents traveling on NM 68 face risk of rockfall events.	The rockfall devices modify rural character; local residents benefit from improved rockfall protection on NM 68.		

Visual Resources	No change to visual character	<p>Fence, mesh, and barrier result in most visual modification of the action alternatives and does not meet VRM Class II management objectives. Skylining of the fence is visible in some locations on NM 68. The fence and barrier would introduce new line, form, and color elements to the view, and the mesh changes the color and texture of the slope below the fence.</p> <p>Alternative A would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative results in moderate to weak form modification, moderate line modification, and moderate color modification. Temporary detours would be a short-term visual impact.</p>	<p>Modification of fence location would reduce skylining by 80% from KOP 2 and by 50% at KOP 5 where people stop to enjoy views. No skylining occurs at KOP 4 under Alternatives A or A-1. Skylining will be reduced by 20% along the remainder of the project area where the views are observed by individuals in moving vehicles. Alternative A-1 meets VRM Class II management objectives except for KOP 5. The fence and barrier would introduce new line, form, and color elements to the view, and the mesh changes the color and texture of the slope below the fence. Alternative A would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative results in weak form, line, and color modification. Temporary detours would be a short-term visual impact.</p>	<p>Fence and barrier result in visual modification and skylining of the fence is visible in some locations on NM 68. Alternative does not meet VRM Class II management objectives because of skylining. The fence and concrete wall barrier would introduce new line, form and color elements to the view. Alternative B would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative results in moderate to weak form modification, moderate line modification, and moderate color modification. Temporary detours would be a short-term visual impact.</p>	<p>Barrier results in visual modification near the roadway, but no visual modification occurs upslope from roadway. Alternative meets VRM Class II management objectives. The concrete wall barrier would introduce new line, form, and color elements to the view. Alternative C would modify less than 3% of the viewshed of the southeast gorge from the roadway and not modify the viewshed from the river. Alternative results in weak form and line modification, and moderate color modification. Temporary detours would be a short-term visual impact.</p>
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Scenic River and ACEC	No effect	Impacts primarily visual resulting from fence, mesh, and barrier – BLM Manual management standards for roads along Scenic Rivers would not be met, due to visual impacts, and the alternative would not conform with the <i>Rio Grand Final Corridor Plan</i> .	Impacts primarily visual resulting from fence, mesh, and barrier – BLM Manual management standards for roads along Scenic Rivers would be met with visual modifications to prevent skylining. The alternative would conform with the <i>Rio Grand Final Corridor Plan</i> except for skylining of fence at KOP 5.	Impacts primarily visual resulting from fence and barrier – BLM Manual management standards for roads along Scenic Rivers would not be met, due to visual impacts, and the alternative would not conform with the <i>Rio Grand Final Corridor Plan</i> .	Impacts primarily visual resulting from barrier – BLM Manual management standards for roads along Scenic Rivers would be met, and the alternative would conform with the <i>Rio Grand Final Corridor Plan</i> .
Long-term Recreation Impacts	Not expected to affect rafting, fishing, wildlife watching and, camping. Naturalness will remain unchanged.	Not expected to affect rafting, fishing, wildlife watching, and camping. No impact on these activities but may cause a slight to moderate impact to experience (naturalness) because of visibility of skylining fence.	Not expected to affect rafting, fishing, wildlife watching, and camping. No impact is expected on these activities. Alternative A- 1 may slightly impact experience (naturalness) since skylining of the fence is reduced and will have a greater impact at KOP 5 where skylining cannot be reduced by 80%.	Not expected to affect rafting, fishing, wildlife watching, and camping. No impact on these activities but may cause a slight to moderate impact to experience (naturalness) because of visibility of skylining fence.	Not expected to affect rafting, fishing, wildlife watching, and camping. No impact on these activities and is not expected to impact experience (naturalness).
Construction Socioeconomic Impacts	None	Travel delays of 30-minutes could affect weekday travelers between Española and Taos – construction scheduled between 8:30 am and 4:30 pm to avoid impacts to commuter traffic. Traffic to local Embudo-Dixon-Pilar fall arts/crafts festivals and to fall Taos festivals could be delayed on weekdays – construction will not occur on weekends when most festival activity occurs. Access to the river will affect fisherman, visitors, and other river users during construction. Construction will not occur on weekends when many individuals visit the river.			

Long-term Socioeconomic Impacts	No effect on local businesses including tourism, local retailers, river rafting and boating – no low income or minority communities will be affected	No effect on local businesses including tourism, local retailers, river rafting and boating – no low income or minority communities will be affected. May result in decrease of property damage and reduced loss of life.		
Slope Stability	Rocky slopes would remain unstable with rocks continuing to fall on roadway	Lower rocky slopes would be completely stabilized and fence would catch falling rocks from upper slopes. Barrier wall would assist in keeping rocks out of the roadway.	Lower slopes would remain unstable and fences would catch falling rocks from upper slopes. Barrier wall would assist in keeping rocks out of the roadway.	Rocky slopes would remain unstable but barrier would assist in keeping some rocks out of the roadway.
Soils Disturbance	2.0 acres	Soils are shallow and absent in areas with geologic surface material. Disturbance will consist of clearing and shallow excavation (less than 3 feet) of surface vegetation, soil, and geologic material. Exposed areas will be subject to erosion during construction. After construction, erosion will occur in exposed areas. A total of 29.35 acres will be affected. Slope mesh will reduce erosion.	Soils are shallow and absent in areas with geologic surface material. Disturbance will consist of clearing and shallow excavation (less than 3 feet) of surface vegetation, soil, and geologic material. Exposed areas will be subject to erosion during construction. After construction, erosion will occur in exposed areas. A total of 29.35 acres will be affected.	Soils are shallow and absent in areas with geologic surface material. Disturbance will consist of clearing and shallow excavation (less than 3 feet) of surface vegetation, soil, and geologic material. Exposed areas will be subject to erosion during construction. After construction, erosion will occur in exposed areas. A total of 8.05 acres will be affected.
Water	Sediment transport occurs in the presence of water	Sediment transport occurs during construction in the presence of water – stormwater pollution prevention plan (SWPPP) needed. After completion of construction, sediment transport will be reduced but will occur in exposed areas depending on level of soil disturbance.		
Wildlife and Fish	Occasional wildlife disturbance occurs during routine maintenance operations	Noise and movement of equipment will disturb wildlife during construction – project area continues to provide low quality wildlife habitat after construction		

Threatened and Endangered Species	No effect on listed species	No effect on bald eagle during construction with mitigation measures (monitoring and delay of construction when eagles are present) – no other effects on listed species
Cultural Resources	No effect	
Air Quality	Dust may be produced during routine maintenance operations	Dust control measures needed during construction – no long-term effects
Noise	No effect	Short-term construction noise produce by equipment and installation of rockfall systems.
Relocations and Easement	No effect	NMDOT would obtain construction easement for MP 19-37-19.39 segment and amend current BLM right-of-way agreement form MP 27.29-27.85 segment
Multi-modal transportation	Pedestrians, bicyclists, and motorists at risk for rockfall incidents	Pedestrians, bicyclists, and motorists would have reduced risk of rockfall incidents

3.8 Construction Scheduling Options

Spring, summer, and fall options for scheduling construction were considered. Winter was eliminated from consideration because the cold temperatures and short day length would likely extend the time needed for construction. Some construction activities such as installation of concrete barriers and fence posts would not be possible under extremely cold conditions.

Spring and summer are potential construction periods. The warmer temperatures would allow for normal construction activities. Nevertheless, rafting season along the Rio Grande occurs during late spring and summer. Construction detours would interfere with river access, especially at the Quartzite river access. Construction noise would also be audible from some reaches of the river. Spring and summer are also the nesting season for migratory birds including protected species such as the gray vireo, southwestern willow flycatcher, and yellow-billed cuckoo. In addition, late summer is monsoon season when most rockfall events occur. For these reasons, construction during spring and summer is not recommended.

Fall construction is recommended. A 90-workday construction period would occur be used starting just after the Labor Day weekend. Fall construction would eliminate impacts to rafting, which occurs primarily in the late spring and summer. Construction during the fall also avoids the summer monsoon season. The principal negative impact is the fall arts and crafts festivals that occur in local gorge communities and the weekend festivals in Taos. To minimize effects on the fall festivals, construction would be scheduled on weekdays only. Daily construction activities that affect traffic flow will occur between 8:30 and 4:30 pm to avoid impacts to daily commuting traffic along NM 68. Night time construction is not considered feasible on this project due to safety concerns for workers and motorists. NMDOT would keep local communities informed of detours and construction progress primarily through variable message boards, radio spots, and internet web sites.

To keep traffic flowing during construction, effective detour routes will be developed. Two pull-outs between MP 27 and MP 28 will be used to divert traffic.

4.0 Affected Environment and Direct Impacts

4.1 General Project Setting

The project area includes two segments along NM 68 in the Rio Grande Gorge of north-central New Mexico. The MP 19.37-19.39 segment is located on NMDOT right-of-way and private land in Rio Arriba County, and the MP 27.29-27.85 is located in Taos County on NMDOT right-of-way and BLM public land. The 19.37-19.39 segment appears on the *Velarde* U.S. Geological Survey 7.5' quadrangle map and is located in Section 24, Township 23 North, Range 9 East. The MP 27.29-27.85 segment appears on the *Carson* U.S. Geological Survey 7.5' quadrangle map and is located in Sections 5 and 6, Township 23 North, Range 11 East and Section 32, Township 24 North, Range 11 East. Plan view of the project is displayed in Appendix C.

4.2 Communities and Land Use

Affected Environment

NM 68 occurs in a rural area with scattered development. Most of the Rio Grande Gorge consists of rural residential and agricultural lands under private or BLM ownership. The steep terrain results in scattered communities and restricts development in most parts of the gorge. Communities along the corridor include Embudo, Pilar, Riconada, and Velarde. Pilar is located about 0.5 miles north of the MP 27.29-27.85 segment of the project area. The MP 19.37-19.39 segment of the project area is located in the southern part of Embudo. Both communities have dispersed homes and agricultural fields. Small-scale agricultural production includes alfalfa, corn, and vegetables production as well as apple and peach orchards. Pockets of pastureland, used mainly for horses, occur within the gorge. Small-scale roadside businesses also are present in the area and include stores, fruit stands, art galleries, and other small businesses.

BLM public lands are managed according to FLPMA and Resource Management Plans (RMP). The Record of Decision for the Taos RMP was signed on July 26, 1988. The plan guides BLM management of lands as follows.

The Taos Resource Management Plan (RMP) has been prepared to provide a comprehensive framework for managing the public lands and for allocating resources during the next 10 to 20 years using the principals of multiple use and sustained yield. The RMP establishes areas for limited, restricted or exclusive uses, levels of production, allowable resource uses, resource condition objectives, program constraints, and general management direction (BLM, 1988, page 1-1).

As a supplement to the Taos RMP, *The Rio Grande Corridor Final Plan* outlines management strategies for public lands and resources along 94 miles of the Rio Grande and 43 miles of tributaries (BLM, 2000). The plan defines desired conditions to be achieved during the 15-year life of the plan including the following:

- Protection and enhancement of natural, historic, archaeologic, and scenic resources;
- Development and maintenance of recreation areas and facilities; and
- Provision of opportunities for commercial and personal uses that are compatible with sustained biodiversity, a healthy ecosystem, and scenic quality.

The project area is included in the plan's Lower Gorge Unit. The Lower Gorge Unit extends along the Rio Grande from where the Rio Pueblo de Taos empties into the Rio Grande, above the Taos Junction Bridge, to the Velarde Diversion Dam. The unit contains three segments: Orilla Verde, Racecourse, and Bosque. The MP 27.29-27.85 segment project area occurs within the Racecourse segment, which is a popular whitewater river rafting area. Most rafters enter the river at the Quartzite recreation site west of MP 28.0. The MP 19.37-19.39 segment of the project area occurs on private land in the Bosque segment, which consists of small pastures, cottonwood riparian woodlands, fruit orchards and private homes. This river segment experiences less rafting use than the Racecourse segment (BLM, 2000).

Both Rio Arriba and Taos counties have developed comprehensive plans. The *Draft Rio Arriba County Comprehensive Plan, 2030 Growth Management Plan* describes goals and objectives for development and growth during the next 30 years in the county (Rio Arriba County Planning and Zoning Department, 2004). The project area is located within the plan's Rio Embudo Planning District, which includes communities along the Rio Grande from Embudo to the county line at Rinconada. With respect to NM 68, the plan states that local communities are concerned with the need to widen NM 68 to accommodate increased traffic to Taos. Widening would be detrimental to the communities. The plan recommends that NM 68 be relocated on BLM lands away from the existing roadway. This recommendation has been mentioned several times at public involvement meetings for this project. The *Taos County Comprehensive Plan Update 2004, County-wide Vision, Goals, and Strategies* provides goals and objectives for county development: "The Plan identifies and analyses growth and development issues and indicates how local residents and their elected officials want the regional community to develop in the next twenty years" (Planners Ink, 2004, page 3). With respect to NM 68, the plan contains the following transportation element strategy for safety improvements: "Strategy 12. Review the highway accident statistics and prioritize the five highest-risk roadways and their causes, and working with the NMDOT, program these safety improvements in the STIP (State Transportation Improvement Program), e.g., the Gorge Bridge, State routes 518 and 68, etc. (Planners Inc, 2004, page 52).

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no construction impacts on local communities and land uses.

Long-term Impacts

The No Build Alternative would not change current conditions for local communities. Local residents who travel on NM 68 would face the risk of rockfall crashes along the MP 19.37-19.39 segment and MP 27.29-27.85 segment of the project area. Travelers from local communities would be at risk, although low, for a rockfall crash with the chances for a crash increasing with the frequency of travel along NM 68. Maintenance activities will disturb 2.0 acres of land (see Section 4.24).

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier, A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier, and Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres of private land at the MP 19.37-19.39 segment and 23.89 acres of public land at the MP 27.29-27.85 segment would be affected (see Table 3.1 for a breakdown of acreage affected). An

additional 3.0 acres would be disturbed along NMDOT right-of-way at two pull-outs for construction of one-lane detours areas. The Roadside Rest Area would be paved and become a permanent pull-out. Asphalt at the Albert's Falls Rest Areas will be removed, and the disturbed area will be scarified and revegetated with native vegetation. The nearby communities of Embudo and Pilar would be affected by traffic detours along NM 68 and noise impacts from construction activities. Local travelers may experience delays of 15-30 minutes during construction. Construction activities that affect traffic flow will be scheduled between 8:30 am and 4:30 pm to minimize impacts to work commuters traveling to employment centers such as Española, Los Alamos, and Taos.

Long-term Impacts

Total area affected would be 29.35 acres (see Table 3.1). Approximately 0.96 acres of private land at the MP 19.37-19.39 segment and 23.89 acres of public land at the MP 27.29-27.85 segment would be affected. This land would not be available for other land uses, but steep slopes in the project area restrict most land uses such as livestock grazing, recreation, and construction of developments. The presence of the rockfall fence and slope mesh would modify the undisturbed rural character in the project area. The fence, mesh, and barrier would modify visual resources by the presence of structures where they did not occur previously. Portions of the slope would be covered with structures. Local residents would benefit from reduced rockfall incidents along NM 68 at MP 19.37-19.39 and MP 27.29-27.85. Maintenance activities would affect 1.5 acres (see Section 4.24).

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Approximately 0.14 acres of private land at the MP 19.37-19.39 segment and 3.41 acres of public land at the MP 27.29-27.85 segment would be affected. An additional 3.0 acres would be disturbed along NMDOT right-of-way at two pull-outs for construction one-lane detours. The Roadside Rest Area would be paved and become a permanent pull-out. After the completion of construction, asphalt at the Albert's Falls pull-out would be removed, and disturbed areas would be scarified and revegetation with native species. The nearby communities of Embudo and Pilar would be affected by traffic detours along NM 68 and noise impacts from construction activities. Local travelers may experience delays of 15-30 minutes during construction. Construction activities will be scheduled between 8:30 am and 4:30 pm to minimize impacts to work commuters traveling to employment centers such as Española, Los Alamos, and Taos.

Long-term Impacts

Total area affected would be 8.05 acres (see Table 3.1). Approximately 0.14 acres of private land at the MP 19.37-19.39 segment and 3.41 acres of public land at the MP 27.29-27.85 segment would be affected. This land would not be available for other land uses, but steep slopes in the project area restrict most land uses such as livestock grazing, recreation, and construction of developments. The presence of the concrete wall barrier would modify the undisturbed rural character in the project area but would have the least visual impact of the build alternatives. The visual effect would be limited to areas adjacent to the roadway. Local residents would benefit from reduced rockfall incidents along NM 68 at MP 19.37-19.39 and MP 27.29-27.85. Maintenance activities would affect 1.5 acres (see Section 4.24).

4.3 Safety

Affected Environment

Rockfall incidents directly affect safety on NM 68. The rock covered slopes on the southeast side of NM 68 are not stabilized and vulnerable to rocks becoming dislodged, especially when moisture is present. Since the installation of rockfall protection systems in the early 1990s, crashes involving rocks have been reduced. Nevertheless, rocks continue to fall on the roadway in areas where rockfall protection systems are lacking. From 1998 through 2003, 234 crashes occurred along NM 68 in the gorge. Thirty-six of the crashes were rockfall related. Rockfall related crashes represented 15% of the total crashes during the period. The MP 27.3-27.9 segment of NM 68 through the gorge has had a high incidence of falling rock related crashes. This is a major gap in rockfall protection along NM 68 along with a small gap occurs at the MP 19.37-19.39 segment near Embudo.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no construction impacts.

Long-term Impacts

No rockfall protection devices would be used. Rocks falling from upper and lower slopes either fall onto the roadway shoulder or bounce onto roadway. Rocks are removed by NMDOT maintenance workers. Without a rockfall protection system, most falling rocks land on the roadway. Large rocks would be unrestrained to inflict maximum damage to the traveling public. A rockslide may cover the roadway completely, restricting traffic movement. NMDOT could be held liable for not implementing measures to reduce rockfall crashes along NM 68.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Risk of rockfall would continue until rockfall protection systems have been installed.

Long-term Impacts

Three rockfall protection devices would be used: (1) fence captures rocks falling from upper slope, (2) slope mesh holds rocks on lower slope, and (3) intermittent concrete barrier retains fallen rocks until removed by maintenance workers. Very large rocks exceeding the limits of design may occasionally breach through the fence, and the intermittent concrete wall barrier. Placement of the three safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the highway by approximately 90%. The slope mesh and concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 99%. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.

Direct Impacts of Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Risk of rockfall would continue until rockfall protection systems have been installed.

Long-term Impacts

Three rockfall protection devices would be used: (1) fence captures rocks falling from upper slope, (2) slope mesh holds rocks on lower slope, and (3) intermittent concrete barrier retains fallen rocks until removed by maintenance workers. Very large rocks exceeding the limits of design may occasionally breach through the fence, and the intermittent concrete wall barrier. Placement of the three safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the highway by approximately 85-90%. During construction, a 6-foot fence will be considered near KOP 5. The 6-foot fence would still catch 85-90% of the rocks. The 6-foot high fence would be subject to approval by an NMDOT Geotechnical Designer under the condition that it will not compromise safety. The slope mesh and concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 99%. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Risk of rockfall would continue until rockfall protection systems have been installed.

Long-term Impacts

Two rockfall protection devices would be used: (1) fence captures rocks falling from upper slope and (2) continuous concrete barrier retains fallen rocks until removed by maintenance workers. Very large rocks exceeding the limits of design may occasionally breach through the fence and continuous concrete wall barrier. Rocks can also occasionally become dislodged from lower slopes and may in some instances breach the barrier. Placement of the two safety devices would reduce rocks reaching the roadway. The 8-foot high rockfall fence would reduce the rocks falling from above the cut slope by approximately 90%. The concrete wall barrier would reduce the rocks falling out of the cut slope by approximately 80% initially and decrease with time as the concrete wall barrier deteriorates from rockfall impacts. Highway user confidence in the project area would increase substantially with the appearance of the safety devices.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Risk of rockfall would continue until rockfall protection systems have been installed.

Long-term Impacts

One rockfall protection device would be used: falling rocks, primarily lower slopes, are retained by the continuous concrete wall barrier until removed by maintenance workers. The continuous concrete barrier wall would capture slowly rolling rocks, but rapidly rolling rocks, especially from upslope areas may breach the barrier and land on the roadway. A rockslide may overcome the barrier wall and cover the roadway completely, restricting traffic movement. Rocks falling from above the cut slope would be reduced by 0%. The concrete wall barrier would reduce rocks falling out of the cut slope by approximately 80% initially and decrease with time as the barrier wall deteriorates from rock fall impacts. Maintenance to remove rocks from behind the wall barrier and replace damaged wall barrier sections would increase compared to Alternative A. Highway user confidence in the project area would not increase substantially with the appearance of the safety devices.

4.4 Visual Resources

Affected Environment

The BLM uses the visual resource inventory system described in the BLM (1986) Manual Handbook 8410 to determine visual values. Factors that affect sensitivity of scenic quality include:

- **Type of User** – Visual sensitivity varies with type of user. Areas such as the Rio Grande Gorge that are viewed by recreational sightseers are more sensitive than areas where workers or others with less interest in views pass through on a regular basis.
- **Amount of Use** – Areas viewed by a large-number of people like the Rio Grande Gorge are more visually sensitive than other areas.
- **Public Interest** – The visual quality of an area may be of concern to local, state, or national groups. Public interest in the views of the Rio Grande Gorge has been documented at public and stakeholder meetings for this project; however, there is also an interest in balancing views with safety needs.
- **Adjacent Land Uses** – The interrelationship with adjacent lands can affect visual sensitivity of an area. The project area occurs in undeveloped and residential areas that work to maintain the visual sensitivity of an area.
- **Special Areas** – The importance of the views along the Rio Grande Gorge have been highlighted by the Scenic River and Area of Critical Environmental Concern (ACEC) designations.

Resource managers incorporate a scenic quality evaluation, sensitivity level analysis, and a delineation of distance zones to classify BLM lands into four Visual Resource Management (VRM) classes: Class I and II – most valued, Class III – moderate value, and Class IV – least value. According to the *Rio Grande Corridor Final Plan*, the portion of the Lower Gorge Unit that includes the project area is designated as VRM Class II with the following management objective and guidelines:

To retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape (BLM, 2000, page 3-29).

To achieve this objective, the BLM plans to acquire land on a willing seller basis, develop recreation sites, and revegetate closed roads. The plan also states that the BLM will develop partnerships with the NMDOT to improve the appearance of the NM 68 right-of-way.

The gorge is a distinctive visual resource that is enjoyed by local residents, visitors to the area, travelers along NM 68, and river rafters. The expansive views of the gorge, distant mountains, surrounding hills, riparian vegetation, river, and small farms all contribute to the importance of the gorge as a visual resource. The steep, rugged texture of the pinkish-tan colored escarpments on the east side of NM 68 are an important visual resource. Distant views of the Sangre de Cristo Mountains to the east and Jemez Mountains to the west are apparent from some points along NM 68. Hilly terrain covered with grassland/shrubland and piñon/juniper vegetation with scattered rock outcrops occurs throughout the gorge. Cottonwood trees border the river along the length of the gorge adding a green color to bottomland areas in the spring and summer and gold color in the fall. The river itself is visible from scattered locations along NM 68 and is one of the dominant visual elements for river rafters. The small farms and pastures provide a rural agricultural character to portions of the gorge.

A Visual Resources Questionnaire was developed to obtain input from stakeholders regarding their opinions on visual resources in the Rio Grande Gorge. Stakeholders then responded to the Visual Resource Questionnaire as follows:

1. What visual characteristics of the Rio Grande Gorge are important to you?
 - Rock formations/geology (2 responses).
 - River (2 responses).
 - Bald eagle at Glen Woody Bridge.
 - Looking at rafters.
 - Pilar Mesa, towards camp areas – mirror image formation is cool.
 - Looking north: rock formations, mesa top, skyline, and expansive views.
 - Can see Wheeler Peak from county line.
 - Life is more important than view.
 - Safety is the issue – rock totaled our minivan.
2. Where can you see the best views of the Rio Grande Gorge?
 - Just south of the project area at an upslope part of highway near the big, red gigantic outcrop.
 - Just before you get in canyon, north of Velarde near diversion.
 - From the rafters' viewpoint, you get a different view.
 - Rafters don't want to see anything man-made.
3. What is your opinion regarding the construction of additional rock fall nets, fences, and barriers, and NM 68? What types of rockfall protection structures are best in terms of location (placement on the slope), type (fences, nets, or barriers), and color?
 - Make wall barrier more attractive – texture – not just cement.
 - Need to camouflage silver metal, such as rust color.
 - Best to let just the structure weather.
 - Upright post is what stands out.
 - Color and texture so it is not uniform looking.

- Check spacing of posts.
- It is less of a problem to have structures within the corridor of disturbance versus upslope.
- How will the fence be erected? (With a crane.)
- Workers will have to climb slopes so will keep fence close to road.
- Anything going to be done near county line? There are dirt and rocks. That is where I was hit.
- Do what is necessary.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would not result in any visual construction impacts.

Long-term Impacts

The No Build Alternative would not result in any visual impacts except for periodic maintenance activities along NM 68.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction would modify the views at the project area. The project area would be disturbed completely, and the presence of construction equipment would detract from views at the project area during the three-month construction period. Opportunities for travelers to enjoy views would be affected since travelers will be paying attention to construction detours. Temporary detours would be a short-term visual impact. Travelers would be unable to view the gorge or river from the Albert's Falls and Rest Area pull-outs since these areas will be used for detours.

Long-term Impacts

A visual simulation of the alternative was conducted from eight key observation points (KOP) (see KOP map and photographs in Appendix B). Alternative A would introduce a rockfall fence and slope mesh to the viewshed at the MP 19.37-19.93 and MP 27.29-27.85 segments. The fence would be rust colored to help blend into the background landscape. Alternative A is the most visible of the alternatives and result in the greatest visual modification. The fence would introduce new line, color, and form elements to the view, and the mesh changes the color and texture of the slope below the fence. The fence would be most visible on the horizon and would be observed at the horizon near MP 25.5 to southbound drivers and in the far distance from the MP 28.0 overlook. Drivers would be able to see the fence and mesh at MP 19.3-19.5 and MP 27.0 and 28.0. The fence and slope mesh would be only slightly visible to rafters from the river. They would be most visible from just south of the Quartzsite recreation site. Further south, the MP 27.29-27.85 segment would only be visible from a few points along the river and only with careful observation. The MP 19.37-19.39 segment is not visible from the river but is visible from a few houses located north of NM 68. Alternative A would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative A results in moderate to weak form modification, moderate line modification, and moderate color modification. Fence, mesh, and

barrier result in most visual modification of the action alternatives and does not meet VRM Class II management objectives. Skylining of the fence is visible in some locations on NM 68.

Direct Impacts of Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction would modify the views at the project area. The project area would be disturbed completely, and the presence of construction equipment would detract from views at the project area during the three-month construction period. Opportunities for travelers to enjoy views would be affected since travelers will be paying attention to construction detours. Temporary detours would be a short-term visual impact. Travelers would be unable to view the gorge or river from the Albert's Falls and Rest Area pull-outs since these areas will be used for detours.

Long-term Impacts

Alternative A-1 is similar to Alternative A, but the location of the rockfall fence would be adjusted to reduce skylining. During construction, NMDOT and BLM will coordinate regarding the placement of rockfall fence to reduce skylining. The rockfall fence will be located to reduce skylining by 80% from Key Observation Points (KOP) 2 and by 50% at KOP 5 (improvement over Alternative A, see visual simulations in Appendix B) where people stop to enjoy views. No skylining occurs at KOP 4 under Alternatives A or A-1. During construction, a 6-foot fence will be considered near KOP 5. The 6-foot high fence would be subject to approval by an NMDOT Geotechnical Designer under the condition that it will not compromise safety. Skylining will be reduced by 20% along the remainder of the project area where the views are observed by individuals in moving vehicles. Field verification for skylining will include having workers stand on the ridge with survey poles to verify fence height/location and make adjustments. NMDOT will use colored concrete on the wall barrier. The barrier will be colored to blend with the landscape. Alternative A-1 meets VRM Class II management objectives except for KOP 5 where safety improvements provided by the rockfall fence are need to reduce rockfall risks. The fence and barrier would introduce new line, form, and color elements to the view, and the mesh changes the color and texture of the slope below the fence. Alternative A-1 would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative A-1 results in weak form and line, and color modification.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Construction would modify the views at the project area. The project area would be disturbed completely, and the presence of construction equipment would detract from views at the project area during the three-month construction period. Opportunities for travelers to enjoy views would be affected since travelers will be paying attention to construction detours. Temporary detours would be a short-term visual impact. Travelers would be unable to view the gorge or river from the Albert's Falls and Rest Area pull-outs since these areas will be used for detours.

Long-term Impacts

A visual simulation of the alternative was conducted from eight key observation points (KOP) (see KOP map and photographs in Appendix B). Alternative B will introduce a rockfall fence and concrete wall barrier to the viewshed at the MP 19.37-19.93 and MP 27.29-27.85 segments. The fence would be rust colored to help blend into the background landscape. The fence and concrete wall barrier would introduce new line, form, and color elements to the view. The fence would be most visible on the horizon and would be observed at the horizon near MP 25.5 to southbound drivers and in the far distance from the MP 28.0 overlook. The barrier would be colored to match the landscape and not attract much attention because it would be located adjacent to the roadway. Drivers would be able to see the fence and concrete wall barrier at MP 19.3-19.5 and MP 27.0 and 28.0. The fence would be only slightly visible to rafters from the river, and it would be most visible from just south of the Quartzsite recreation site. Further south, the MP 27.29-27.85 segment would only be visible from a few points along the river and only with careful observation. The MP 19.37-19.39 segment is not visible from the river but is visible from a few houses located north of NM 68. The concrete wall barrier would not be visible from the river or from houses north of the MP 19.37-19.39 segment. Alternative B would modify less than 5% of the viewshed of the southeast gorge from the roadway and less than 1% of the viewshed from the river. Alternative B does not meet VRM Class II management objectives because of skylining. The alternative results in moderate to weak form modification, moderate line modification, and moderate color modification.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Construction would modify the views at the project area. The project area would be disturbed completely, and the presence of construction equipment would detract from views at the project area during the two-month construction period. Opportunities for travelers to enjoy views would be affected since travelers will be paying attention to construction detours. Temporary detours would be a short-term visual impact. Travelers would be unable to view the gorge or river from the Albert's Falls and Rest Area pull-outs since these areas will be used for detours. Since this alternative is easiest to construct with no upslope construction activities, the construction visual impacts will be less than the other alternatives.

Long-term Impacts

Alternative C will introduce a concrete wall barrier to the viewshed at the MP 19.37-19.93 and MP 27.29-27.85 segments. The concrete wall barrier would introduce new line, form, and color elements to the view. The barrier would be colored to match the landscape and not attract much attention because it would be located adjacent to the roadway. Drivers would be able to see the concrete wall barrier at MP 19.3-19.5 and MP 27.0 and 28.0. The concrete wall barrier would not be visible from the river or from houses north of the MP 19.37-19.39 segment. The concrete wall barrier has the least visual impacts of any of the alternatives. Alternative C would modify less than 3% of the viewshed of the southeast gorge from the roadway and not modify the viewshed from the river. Alternative C meets VRM Class II management objectives. The alternative results in weak form and line modification, and moderate color modification.

4.5 Protected Areas: Scenic River, ACEC, and Section 4(f) Properties

Affected Environment

The Rio Grande reach near the project area is a designated Scenic River, and BLM lands in the gorge are designated as an Area of Critical Environmental Concern (ACEC). Northern reaches of the Rio Grande have been part of the National Wild and Scenic River system since the establishment of the system by Congress in 1968. The 12-mile reach of the river from the Taos Junction Bridge to just past the County Line Recreation Site was added as a *scenic* segment of the Rio Grande. The MP 27.29-27.85 segment of the project area parallels this Scenic River segment. The Scenic River designation is intended to maintain the existing condition of a river. According to Appendix 3 of the *Rio Grande Final Corridor Plan* (BLM, 2000, page A3-11), a Scenic River has the following attributes:

- Free flowing – low dams, diversion works, or other minor structures that do not cause flooding of the natural riverbank may not bar consideration. Further construction is restricted.
- Accessible by roads that may occasionally bridge the river area – short stretches of inconspicuous and well-screened roads or railroads paralleling the river area may be permitted.
- Shoreline is largely primitive – small communities are limited to short reaches of the total area. Agricultural practices that do not adversely affect the river area may be permitted.
- Water quality should meet minimum criteria for desired types of recreation, except where such criteria would be exceeded by natural background conditions and esthetics. Capable of supporting propagation of aquatic life normally adapted to the habitat of the stream, or capable of being restored to that quality.

The BLM Manual section on wild and scenic rivers, contains the following standards regarding road and trail construction along Scenic River Areas:

Roads or trails may occasionally bridge the river area or short stretches of conspicuous or long stretches of inconspicuous and well-screened roads could be allowed. Maintenance of existing roads and trails, and any new roads or trails, shall be based on the type for which the roads/trails are constructed and the type of use that will occur in the river area (BLM, 1993, page 30).

ACECs are cultural, scenic, or natural area requiring special management. Section 103(a) of the Federal Land Policy and Management Act of 1976 (FLPMA at 43 USC 1702) defines an ACEC as follows:

The term “area of critical environmental concern” means areas within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to historic, cultural, or scenic values, fish or wildlife resources or other natural systems or processes, or to protect life and safety from natural hazards.

The MP 27.29-27.85 segment of the project area occurs within the Lower Gorge ACEC, which occupies 16,351 acres along a 14-mile reach of the Rio Grande from Pilar to the Velarde Diversion Dam. The ACEC designation was based on the area’s value for recreation, wildlife habitat, and riparian vegetation. As mentioned in the previous section, VRM Class II guidelines are applied to management of BLM lands.

The BLM has developed a partnership with the NMDOT to improve the visual appearance of NM 68 and identify safe pullouts for sightseeing and parking along the roadway (BLM, 2000).

Section 4(f) programs were included as part of the Department of Transportation Act of 1966 codified at 49 USC 303 with FHWA regulations codified at 23 CFR 771.135. Under this provision, the department secretary will not approve any transportation program or project that requires the use of publicly owned land used as a public park, recreational area, or wildlife/waterfowl refuge of national, state, or local significance. Also included is any land containing a historic site of national, state, or local significance. The federal, state, or local official having jurisdiction over such land makes the determination regarding national, state, or local significance. Such lands are not to be used for a transportation program or project unless: (1) there is no feasible alternative to use of such land, and (2) such program or project includes all possible planning to minimize harm to such park, recreation area, wildlife or waterfowl refuge, or historic site that may result from such use. These requirements are commonly referred to as Section 4(f) requirements; the lands affected are known as Section 4(f) properties. The FHWA has adopted Section 4(f) requirements for all highway projects involving FHWA funds. No Section 4(f) properties occur in the project area. The project will not result in a constructive use of recreation opportunities along the Rio Grande.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no impact on Scenic River, ACEC, or Section 4(f) areas during construction.

Long-term Impacts

The No Build Alternative would have no long-term impacts on Scenic River, ACEC, or Section 4(f) areas.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction impacts would be primarily visual impacts as described in Section 4.4.

Long-term Impacts

Impacts would be primarily visual resulting from fence, mesh, and barrier. BLM Manual management standards for roads along Scenic Rivers would not be met, due to visual impacts, and the alternative would not conform with the *Rio Grand Final Corridor Plan*.

Direct Impacts of Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction impacts would be primarily visual impacts as described in Section 4.4.

Long-term Impacts

Impacts would be primarily visual resulting from fence, mesh, and barrier. BLM Manual management standards for roads along Scenic Rivers would be met with visual modifications to prevent skylining. The alternative would conform with the *Rio Grand Final Corridor Plan*. Management standards for roads along Scenic Rivers would be met except at KOP 5 where skylining of the fence cannot be reduced by 80%.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Construction impacts would be primarily visual impacts as described in Section 4.4.

Long-term Impacts

Impacts would be primarily visual resulting from fence and barrier. BLM Manual management standards for roads along Scenic Rivers would not be met, due to visual impacts, and the alternative would not conform with the *Rio Grand Final Corridor Plan*.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Construction impacts would be primarily visual impacts as described in Section 4.4.

Long-term Impacts

Impacts would be primarily visual resulting from barrier. BLM Manual management standards for roads along Scenic Rivers would be met, and the alternative would conform with the *Rio Grand Final Corridor Plan*. Management standards for roads along Scenic Rivers would be met.

4.6 Recreation

Affected Environment

The Rio Grande Gorge is an important recreation area. The BLM aims to provide for a diversity or variety of outdoor recreation opportunities and experiences. The BLM's Resource Opportunity Spectrum (ROS) is a tool used to identify and define recreation opportunities based on physical, social, and managerial settings. Descriptors used with the tool include access, remoteness, naturalness, social encounters, visitor impacts, visual management, and facilities and site management. The MP 27.29-27.85 segment of the project area has the following characteristics based on these descriptors:

- **Access** – Readily accessible from NM 68. The raft and boat launch site provides good access to the river. The river is also accessible from pull-outs along NM 68.
- **Remoteness** – The proximity of NM 68 results in little remoteness along the gorge. However, rafters and boaters can obtain a sense of remoteness along many river reaches where the roadway and structures are not visible.

- **Naturalness** – The Rio Grande Gorge retains much of its naturalness, but NM 68, rural roads, and residences have modified many areas of the gorge.
- **Social Encounters** – Encounters with other individuals is likely throughout the corridor.
- **Visitor Impacts** – Visitors have impacted the area through vehicle use, informal trails, vegetation modification, and regular presence along the river.
- **Visitor Management** – Regular ranger patrols occur along the river. Rafting, boating, and camping activities are regulated.
- **Facilities and Site Management** – Facilities have been developed including the Rio Grande Gorge Visitor Center, Quartzite launch area, overlook near MP 28.0, and pull-outs along NM 68.

The existing condition of the project area is Rural on the ROS. Rafting, fishing, wildlife watching, and enjoyment of the views are the principal recreation of the gorge as well as proximity to camping, fishing, and hiking opportunities. Visitor uses of BLM lands in the Lower Gorge of the Rio Grande was estimated at 258,465 users in 2004 (unpublished BLM data). This included use of the Orilla Verde Recreation Area, Rio Grande Gorge Visitor Center, Quartzite recreation site, County Line river access, and boating from the Taos Junction Bridge to Embudo Station. The BLM operates the Rio Grande Gorge Visitor Center on the east side of NM 68 near MP 28.0 at Pilar. Camping areas are located along NM 570 north of Pilar. The close proximity of NM 68 to the Rio Grande is a contributing factor to the high recreation use in this area. Based on comments from BLM staff and river outfitters, most recreation use occurs between mid-April and mid-September when river flows are higher and temperatures are pleasant. Visitors can easily observe the river from NM 68 and often want to stop at an overlook to view the river and gorge. Recreation users find it convenient to park their vehicles along NM 68 and walk to the river for rafting, boating, fishing, wildlife watching, and looking at views. Nevertheless, steady vehicle traffic along NM 68 can create the potential for crashes.

The Racecourse segment between the Quartzite and County Line recreation sites is an important whitewater rafting area. The MP 27.29-27.85 segment of the project area parallels this Scenic River segment. The *Rio Grande Corridor Final Plan* (BLM, 2000) establishes specific guidelines for rafters and outfitters (river guides) in the Racecourse segment that allow outfitters to launch at Quartzite from 8:30 am to 3:30 pm and limiting 40 passengers per launch (two launches per day per outfitter). The BLM begins restricting launches at Quartzite when the total number of passengers on guided raft or boating trips exceeds 600 passengers per day and when the total number of private rafters and boaters exceeds 300 per day. Vehicle parking along NM 68 is limited to NMDOT approved areas. The following facility improvements are proposed in the *Rio Grande Corridor Final Plan*:

- Quartzite – raise beach level, improve traffic flow with signs and barriers, and install a pay / emergency telephone;
- Rio Grande Gorge Visitor Center – construct parking area improvements;
- Souse Hole – build a permanent rest room and provide more parking;
- County Line Area – build permanent rest rooms, improve access and parking, install a pay / emergency telephone, install signs and barriers for traffic management, and construct landscaping; and
- Other sites – provide portable or vault toilets as needed, develop safe access points for sightseeing and parking, and improve trail access to the river.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no impact on recreation.

Long-term Impacts

The No Build Alternative would have no impact on recreation.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction may affect naturalness of the rural conditions in the project area.

Long-term Impacts

Alternative A is not expected to affect rafting, fishing, wildlife watching, and camping. No impact is expected on these activities, but Alternative A may cause slight to moderate impact to experience (naturalness) because of visibility of skylining fence.

Direct Impacts of Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Construction may affect naturalness of the rural conditions in the project area.

Long-term Impacts

Alternative A-1 is not expected to affect rafting, fishing, wildlife watching, and camping. No impact is expected on these activities. Alternative A- 1 may slightly impact experience (naturalness) since skylining of the fence is reduced and it will have a greater impact at KOP 5 where skylining cannot be reduced by 80%.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Construction may affect naturalness of the rural conditions in the project area.

Long-term Impacts

Alternative B is not expected to affect rafting, fishing, wildlife watching, and camping. No impact is expected on these activities, but Alternative B may cause slight impact to experience (naturalness) because of visibility of skylining fence.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Construction may affect naturalness of the rural conditions in the project area.

Long-term Impacts

Alternative C is not expected to affect rafting, fishing, wildlife watching, and camping. No impact is expected on these activities, and Alternative C is not expected to impact experience (naturalness).

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

The alternatives may affect naturalness of the rural conditions in the project area. Alternatives A-1 and C have reduced impacts on naturalness because of reduced skylining.

Long-term Impacts

Impacts to recreation would be mainly visual impacts as described in Section 4.3. The alternative is not anticipated to modify the ROS of the area. Alternative A is not expected to affect rafting, fishing, wildlife watching, camping, and enjoyment of the views.

4.7 Socioeconomics and Environmental Justice

Affected Environment

An analysis of social impacts includes a consideration of disproportionate impacts on particular population groups, loss of community cohesion, changes in accessibility to facilities of services, and the displacement of people. Economic impacts include effects on business and employment, the local tax base, and factors that are relevant to local economic conditions.

Rio Arriba and Taos counties are predominantly rural counties. As of 2000, Rio Arriba County's population was 41,190 and Taos County's population was 29,979 (see Table 4.1). From 1990 through 2000, Taos County grew at a slightly faster rate (29.6%%) than Rio Arriba County (20.0%). New Mexico's growth rate (20.1%) was similar to Rio Arriba County but lower than Taos County than (U.S. Census Bureau, 2002). New Mexico and the two counties are expected to experience continuing growth during the next 15 years. The project area occurs within Census Tract 2 in northeastern Rio Arriba County and Census Tract 9523 in western Taos County. In the year 2000, 4073 people resided in Census Tract 2 and Census Tract 9523.

Table 4.1 Demographic Characteristics of Rio Arriba and Taos Counties

Location	2000 Population	% Growth 1990-2000	Projected 2020 Population
New Mexico	1,819,046	20.1%	2,383,116
Rio Arriba County	41,190	20.0%	48,630
Taos County	29,979	29.6%	39,442

Source: U.S. Census Bureau (2002) and University of New Mexico Bureau of Business and Economic Research (2004a)

Executive Order 12898 requires federal agencies to identify and address disproportionate environmental effects on minority and low income populations. Environmental justice is considered part of the NEPA process, including environmental assessment (CEQ, 1997). Furthermore, under Title VI of the Civil Rights Act of 1964, as amended, discrimination based on race, color, or national origin is prohibited under federal programs and assistance. To comply with the Civil Rights Act, agencies should identify and address any disparate impacts on minority populations.

As part of the NEPA process, federal agencies collect minority population and income data to determine if a Community of Concern is present. A Community of Concern has higher minority and/or lower income levels than reference areas. For this project, environmental justice data was obtained from the 2000 census, which is the best source of data on minority and income data for small geographic areas, such as Census Tracts (Table 4.2).

Data was obtained for a Community of Concern that included Census Tract 2 in Rio Arriba County, and Census Tract 9523 in Taos County. The MP 19.37-19.39 segment of the project area occurs in Census Tract 2, and the MP 27.29-27.85 segment of the project area occurs in Census Tract 9523. New Mexico, Rio Arriba County and Taos County served as reference areas for comparison data. As shown in Table 4.2, both counties have a higher percent Hispanic population and lower median and per capita incomes than comparable figures for New Mexico. This data implies that both counties should be considered for environmental justice impacts. Both tracts have a large Hispanic population: 77.9% in Census Tract 2 and 54.4% in Census Tract 9523. Incomes in the tracts are slightly lower than in the state and similar to county incomes with poverty rates following a similar pattern. Census Tract 2 has a median family income of \$34,239 and a family poverty rate 15.0%. Census tract 9523 has a median family income of \$33,558 and a poverty rate of 16.2%. Based on the relatively high minority populations and slightly lower incomes than comparable statewide figures, areas near the project area were evaluated for environmental justice impacts.

Table 4.2 Demographic and Environmental Justice Data

Characteristic	Reference Areas			Community of Concern	
	New Mexico	Rio Arriba County	Taos County	Census Tract 2	Census Tract 9523
Demographics					
- Total population	1,819,046	41,190	29,979	4073	2901
- Median age	34.6 years	34.5 years	39.5 years	37.2 years	39.6 years
- % under 18 years	28.0%	28.6%	24.5%	26.1%	24.0%
- % over 64 years	11.7%	10.9%	12.3%	12.4%	10.8%
- average family size	3.18	3.19	2.98	3.00	2.96
Percent Minority					
- African American	1.9%	0.3%	0.4%	0.4%	0.4%
- Native American	9.5%	13.9%	6.6%	3.3%	1.5%
- Asian / Pacific Islander	1.1%	0.1%	0.4%	0.1%	0.3%
- Hispanic	42.1%	72.9%	57.9%	77.9%	54.4%
Income / Poverty Levels					
- Median family income	\$39,425	\$32,901	\$33,995	\$34,239	\$33,558
- Per capita income	\$17,261	\$14,263	\$16,103	\$15,029	\$14,066
- Percent of families below the poverty level	14.5%	16.6%	16.1%	15.0%	16.2%
- Percent of individuals below the poverty level	18.4%	20.3%	20.9%	19.0%	24.4%
Owner-occupied housing units	677,971	12,281	9570	1277	1062
Renter-occupied housing units	203,526	2763	3105	318	256

Source: U.S. Census Bureau (2002)

As of July 2004, New Mexico had an employment growth rate of 2.1%, the eighth highest employment growth rate in the United States. The unemployment rate in Rio Arriba County was 7.4% and Taos County was 9.8% in July 2004, which are higher figures than the statewide unemployment rate of 5.8% (New Mexico Department of Labor, 2004). In terms of the North American Industrial Classification System (NAICS), the economic sectors employing the most people in Rio Arriba and Taos counties are government, retail trade, health care and social assistance and construction (Bureau of Economic Analysis, 2004). The cities of Española and Taos are the principal economic centers in the area. Retail trade is an important source of revenue for local governments through taxable gross receipts. Española had \$12,818,000 in taxable gross receipts for April-June 2004, and Taos had \$12,764,000 in taxable gross receipts for the same period. This represents a 10.9% increase over the previous year in Española and a 10.2% increase over the previous year in Taos (University of New Mexico Bureau of Business and Economic Research, 2004b).

No employment centers occur within the project area. Employment sources are limited and dispersed. Local businesses include farms, river outfitters, stores, fruit stands, art galleries, and other small businesses. Tourism is an important economic activity in the area because of the river. River outfitters provided whitewater rafting experiences to numerous tourists during the spring and summer. Visitors to the area will off stop and enjoy the canyon as part of their vacations to various attractions in northern New Mexico. Tourists often spend money at restaurants, stores, and lodging in both Española, Taos, and other northern New Mexico cities.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no construction impacts on socioeconomics or environmental justice.

Long-term Impacts

Local residents traveling on NM 68 face risk of rockfall events. No effect on local businesses including tourism, local retailers, river rafting and boating. The No Build Alternative would have no long-term impacts on environmental justice. No low income or minority communities will be affected.

Direct Impacts of the Build Alternatives (Action Alternatives)

Construction Impacts

Construction would not affect environmental justice. Construction will be scheduled from September 2005 (after Labor Day weekend) to November 2005 (before Thanksgiving) in order to minimize impacts to rafting outfitters and other economic benefits of the summer rafting and boating season. Embudo and Pilar residents would be affected by construction detours and noise. Tourist traffic traveling to Taos for fall festivals and local Gorge communities arts and crafts festivals would be slowed down during construction. Local commuters would be delayed by construction. The fall construction would cause delays at times of 15-30 minutes for travelers between Taos and Española. NMDOT would provide traveler information to ensure that these delays do not negatively affect local businesses. Construction activities would be scheduled between 8:30 am and 4:30 pm to minimize impacts to work commuters traveling to employment centers such as Española, Los Alamos, and Taos. Fall construction could affect tourist traffic to fall festivals in Taos and local arts and crafts festivals in Embudo, Dixon, and Pilar. NMDOT will need to provide information to travelers to minimize this impact.

Construction would provide short-term employment to workers on the rockfall systems. Workers would spend money locally on meals and lodging.

Long-term Impacts

The build alternatives are expected to have no long-term impacts on socioeconomics or environmental justice. The alternative would not affect local businesses including tourism, local business, and river rafting and boating. No low income or minority communities will be affected. Improved rockfall protection would benefit local residents who travel along NM 68 with increased safety. The build alternatives may result in decreased property damage and loss of life. NM 68 would continue to provide a transportation corridor for the transport of goods.

4.8 Landforms and Geology

Affected Environment

The project area occurs in a stream valley within the Sangre de Cristo Mountains. It is located in the Southern Rocky Mountain Physiographic Province (Williams, 1986). The landscape consists of hills and

steep, uneven terrain. The Rio Grande Gorge is a canyon extending in a northeast-southwest orientation along the project area. Terrain on the southeast side of the gorge is mountainous with steep slopes. Terrain on the northwest of the gorge is foothill and low mountains with gentler slopes. Elevation at the MP 19.37-19.39 segment of the project area is 5800 feet above mean sea level (amsl), and elevation at the MP 27.29-27.85 segment is 6000-6100 feet amsl.

In response to the rockfall concerns along NM 68, NMDOT contracted with the New Mexico Institute of Mining and Technology in 1992 for a detailed geologic study of the Rio Grande Gorge (Haneberg et al., 1992), which provides most of the information for this section. The Embudo Fault follows the Rio Grande Gorge between Pilar and Embudo. This and other fault along the Rio Grande are not currently seismically active but are indicative of the geologic forces that have shaped the landscape since the Precambrian era. Principal geologic formations include:

- Precambrian Glenwood Formation, which forms the Pilar Cliffs on the southeast side of the gorge, consists of feldspathic quartz-eye schist;
- Precambrian Hondo Group, which overlays the Glenwoody Formation, consists of quartzites, pelitic schists, and phyllites – includes the Ortega, Rinconada, and Pilar formations;
- Miocene to Pliocene Tesuque Formation of the Santa Fe Group consisting of sand and gravels occurring at the top of the Pilar Cliffs;
- Pliocene Servilleta Formation consisting of tholeitic basalts, which overlays the Tesuque Formation on the southeast side of the gorge and the Chamita Formation on the northwest side of the Gorge;
- Miocene to Pliocene Chamita Formation, on the northwest side of the gorge, contains sands with volcanic rock, quartzite and other metamorphic rocks, and volcanic and metamorphic clasts – this formation contains large rotational Toreva block slides;
- Quaternary colluvium, landslide deposits, slope debris and talus occur on the southwest slopes of the gorge; and
- Quaternary alluvium and playa deposits occur in bottomlands along the Rio Grande.

The geologic stability of the gorge is of major concern and was examined in detail by the Haneberg et al. (1992) study. Debris slides and landslide deposits containing a mixture of sand, gravel, and basaltic boulders have the most movement and require stabilization measures to keep rocks off the roadways. Movement of this material is related to rainfall. Toreva block slides from the Chamita Formation are more stable but could be activated during extended precipitation. In addition to rainfall, seismic activity could trigger landslides. Although some earthquakes have been recorded in the general area, these have been relatively small and infrequent. Most of the large earthquakes in the state have been recorded in the middle Rio Grande valley with most occurring near Socorro (Sanford et al., 2002).

The principal mineral deposit in the area is aggregate consisting of sand and gravel. This material commonly occurs in alluvial materials along rivers and drainages. Pumice is mined in the Jemez Mountain region, and mica is mined in Taos County near Picuris Pueblo (McLemore and Hoffman, 2002). No mining operations currently occur at or near the project area.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No construction impacts would occur to geologic resources. Maintenance of existing rockfall systems would occur on an as needed basis and affect approximately 2.0 acres.

Long-term Impacts

Rocks would continue to fall on NM 68 along the MP 19.37-19.39 and MP 27.29-27.85 segments of the project area. The rocky slopes in these segments would remain unstable with rocks continuing to fall on the roadway. Rocks on the roadway would present a safety risk to motorists. Occasionally rocks would impact vehicles.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres of geology and landforms at the MP 19.37-19.39 segment, 23.89 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. Impacts would consist of excavation, clearing and moving rocks, leveling small areas for the rockfall fence, and installing the rockfall fence and slope mesh.

Long-term Impacts

Approximately 29.35 acres of geology and landforms would be affected. Rocks and land surface within the project area would be stabilized. Lower rocky slopes would be completely stabilized, and the fence would catch falling rocks from upper slopes. The wall barrier would assist in keeping rocks out of the roadway. An occasional large rock would break through the fence and roll onto NM 68. The slope mesh would stabilize rocks between the fence and the roadway.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres of geology and landforms at the MP 19.37-19.39 segment, 23.89 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. Impacts would consist of excavation, clearing and moving rocks, leveling small areas for the rockfall fence, and installing the rockfall fence and concrete wall barrier.

Long-term Impacts

Approximately 29.35 acres of geology and landforms would be affected. Rocks falling from above the fence would be caught by the fence. Lower slopes would remain unstable. The wall barrier would assist in keeping rocks out of the roadway. The concrete barrier would catch rocks falling from between the fence and the roadway. An occasional large rock would break through the fence and be caught by the concrete barrier or roll onto NM 68.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Approximately 0.14 acres of geology and landforms at the MP 19.37-19.39 segment, 3.41 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. Impacts would consist of excavation, clearing and moving rocks, and installing the concrete wall barrier.

Long-term Impacts

Approximately 8.05 acres of geology and landforms would be affected. Rocky slopes would remain unstable but the wall barrier would assist in keeping some rocks out of the roadway. Some of the rocks falling from above the concrete wall barrier would be caught by the barrier. Many rocks would bounce over the barrier and roll onto NM 68.

4.9 Soils

Affected Environment

Soils at the project area are prone to erosion and intermixed with rock outcrops. The two principal soil mapping units are the Chimayo – Rock Outcrop Complex, Very Steep and the Orthents Rock Outcrop Complex, Very Steep. The Chimayo Rock Outcrop Complex consists of a mixture of Chimayo cobbly sandy loam and rock outcrop formed from colluvium and residuum or granite. The Chimayo soil has moderate permeability, medium runoff, and a high water erosion hazard. The Orthents Rock Outcrop Complex consists of a mixture of deep Orthents soil and rock outcrop. The Orthents are gravelly and cobbly loams formed from alluvium from the Santa Fe Group geologic formations. This soil has moderate to moderately rapid permeability, rapid runoff, and high water erosion hazard. Slumping also occurs on Orthents. Both soils are best suited for use as rangeland and wildlife habitat (Natural Resources Conservation Service, 1982).

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no construction impacts on soils.

Long-term Impacts

Continued rockfall events at the project area would be accompanied by ongoing soil erosion. Soil would be washed onto the roadway along with rocks after intense rainfall. Maintenance activities would affect 2.0 acres.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier and Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres of soils and rock at the MP 19.37-19.39 segment, 23.89 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. Impacts

would consist of excavation, clearing and moving rocks, leveling small areas for the rockfall fence, and installing the rockfall fence and slope mesh. Measures would be developed to minimize erosion. The Roadside Rest Area would remain a permanent pull-out, and the Albert's Fall pull-out would be revegetated after construction.

Long-term Impacts

Approximately 29.35 acres would be affected. Rocks and land surface within the project area would be stabilized, and this should also reduce soil erosion. Alternative A affects the largest acreage.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres of soils and rock at the MP 19.37-19.39 segment, 23.89 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. The Roadside Rest Area would remain a permanent pull-out, and the Albert's Fall pull-out would be revegetated after construction. Impacts would consist of excavation, clearing and moving rocks, leveling small areas for the rockfall fence, and installing the rockfall fence and concrete wall barrier. Measures would be developed to minimize erosion.

Long-term Impacts

Approximately 29.35 acres would be affected. The fence and barrier would trap soil, but exposed areas would continue to experience soil erosion.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Approximately 0.14 acres of geology and landforms at the MP 19.37-19.39 segment, 3.41 acres of the MP 27.29-27.85 segment, and 3.0 acres at two pull-outs would be affected by construction activities. The Roadside Rest Area would remain a permanent pull-out, and the Albert's Fall pull-out would be revegetated after construction. Impacts would consist of excavation, clearing and moving rocks, and installing the concrete wall barrier. Measures would be developed to minimize erosion.

Long-term Impacts

Approximately 8.05 acres would be affected. The barrier would trap soil, but exposed areas would continue to experience soil erosion. Alternative C affects the smallest acreage.

4.10 Water

Affected Environment

Water issues include surface water, flooding, and groundwater. The project area is within the Rio Grande basin, and the project area drains directly into the Rio Grande. The main channel of the Rio Grande is located within 0.1-0.2 miles of the project area. Water is a key factor in rocks falling onto NM 68. During rain and snow, the ground becomes saturated with water, and rocks are loosened from the ground

and can roll downslope onto the roadway. Freezing and thawing of wet ground can also loosen rocks and result in rockfall.

Areas bordering the Rio Grande occur within the 100-year floodplain (Federal Emergency Management Agency, 1989a and 1989b). No other floodplains have been mapped near the project area. The project area is located outside of the 100-year floodplain.

The Rio Grande is the principal surface water feature near the project area. Streamflows are highly variable from year-to-year and greatly influence by the amount of snowfall received in upstream watersheds. Mean monthly streamflow varies from 283 cubic feet per second (cfs) to 1751 cfs in May and 1764 cfs in June (see Table 4.3). The river rafting season coincides with high flows during the spring and summer months.

Groundwater is accessible near the Rio Grande because the depth to groundwater is shallow. Reported depths to ground water near the project area range from 4 to 48 feet (New Mexico Office of the State Engineer, 2004). In upland locations, drilling wells becomes difficult because of the deep depth of groundwater and presence of bedrock material between the ground surface and aquifers.

**Table 4.3 Average Monthly Streamflows
Rio Grande at Taos Junction Bridge**

Month	Flow in Cubic Feet per Second
January	283 cfs
February	551 cfs
March	668 cfs
April	852 cfs
May	1751 cfs
June	1764 cfs
July	728 cfs
August	418 cfs
September	384 cfs
October	421 cfs
November	529 cfs
December	496 cfs

Source: U.S. Geological Survey (2004)

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

The No Build Alternative would have no construction impacts on waters.

Long-term Impacts

Continued rockfall events at the project area would be accompanied by ongoing sediment transport. Soil would be washed onto the roadway and in some cases into the Rio Grande.

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

Some sediment transportation would occur during construction. The construction contractor will need to prepare a stormwater pollution prevention plan (SWPPP) that implements best management practices (BMPs), such as the use of silt fences, hay bales and catchment basins, to minimize sediment transport. No fill material would be deposited in arroyos, waterways, ponds, lakes, or other waters. No Section 404 permits or Section 401 water quality certifications will be required. The construction contractor will need to obtain coverage under a NPDES permit for general construction activity.

Long-term Impacts

Rockfall systems would reduce the transport of sediment by catching sediment behind fences, slope mesh, and concrete barriers. Sediment would be trapped in the flat-bottomed ditch.

4.11 Wetlands

Affected Environment

No wetlands occur in the project area.

Impacts Under All Alternatives

Construction Impacts

No wetlands are present in the project area. Construction will not affect wetlands

Long-term Impacts

No wetlands are present in the project. No long-term impacts on wetlands are expected.

4.12 Vegetation

Affected Environment

According to Dick-Peddie's (1993) vegetation classification of New Mexico, lands near the project area contain a mixture of Desert Grassland, Juniper Savanna, and Coniferous Mixed Woodland vegetation types. Floodplain-Plains riparian vegetation occurs as a narrow band along the Rio Grande. Much of the project area is devoid of vegetation because of rock outcrops and unstable geologic conditions. Where present, vegetation is scattered with low percent ground cover. Common species include blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), rabbitbrush (*Ericameria nauseosus*), and one-seed juniper (*Juniperus monosperma*). Along the Rio Grande, riparian areas are dominated by a gallery forest of valley cottonwood (*Populus deltoides* ssp. *wislizenii*). Riparian areas near Embudo and Rinconada have been converted to cropland, pastures, and orchards. Vegetation cover is sparse at the project area. Unstable, steep slopes and an abundance of rocks have resulted in less than 10% vegetation cover.

No extensive populations of Class A, B, and C noxious weeds (based on the New Mexico Noxious Weeds List classification) occur within the project area. A few areas of salt cedar (*Tamarix chinensis*), a Class C species is present along the Rio Grande. Siberian elm (*Ulmus pumila*) and Russian olive (*Elaeagnus angustifolia*), both Class C species, occur within the bosque woodland west of the project area. Elimination of infestations is recommended for Class A weeds and containment for Class B weeds; no control is usually recommended for Class C since Class C weeds are usually so well established that control measures are usually not feasible (Nellessen, 2000).

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No vegetation impacts would occur.

Long-term Impacts

The steep, unstable slopes and large amount of rock materials would limit plant establishment. Periodic maintenance activities would affect 2.0 acres. The project areas would continue to have less than 10% vegetation cover.

Direct Impacts of Alternative A – Rockfall Fence with Slope Mesh and Concrete Wall Barrier and Alternative A-1 – Visually Modified Rockfall Fence with Slope Mesh and Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres at the MP 19.37-19.39 segment and 23.89 acres at the MP 27.29-27.85 segment would be affected by construction activities. Less than 10% of this area has vegetation cover.

Long-term Impacts

An increase in vegetation cover would be expected because of increased slope stability. The fence would reduce rockfall and soil erosion resulting in improved vegetation cover. The slope mesh would provide the best slope stabilization to allow plants to become established. The high quantity of rock material and shallow soils would continue to limit vegetation cover. Although there are currently no Class A or B noxious weeds within the project area it is possible they could become established along the roadway. It has been noted on other roadway projects that when concrete wall barriers along roadways collect stormwater runoff they can provide enhanced habitat for Class A or B noxious weeds. A periodic inspection of the wall barrier for noxious weeds should be implemented as part of maintenance. This inspection could occur during cleaning of the area behind the wall.

Direct Impacts of Alternative B – Rockfall Fence with Concrete Wall Barrier

Construction Impacts

Approximately 0.96 acres at the MP 19.37-19.39 segment and 23.89 acres at the MP 27.29-27.85 segment would be affected by construction activities. Less than 10% of this area has vegetation cover.

Long-term Impacts

An increase in vegetation cover would be expected because of increased slope stability. The fence would reduce rockfall and soil erosion resulting in improved vegetation cover. The high quantity of rock material and shallow soils would continue to limit vegetation cover. A periodic inspection of the wall barrier for noxious weeds should be implemented as part of maintenance. This inspection could occur during cleaning of the area behind the wall.

Direct Impacts of Alternative C – Concrete Wall Barrier

Construction Impacts

Approximately 0.14 acres at the MP 19.37-19.39 segment and 3.41 acres of the MP 27.29-27.85 segment would be affected by construction activities. Less than 10% of this area has vegetation cover.

Long-term Impacts

The steep, unstable slopes and large amount of rock materials would limit plant establishment. The project areas would continue to have less than 10% vegetation cover. A periodic inspection of the wall barrier for noxious weeds should be implemented as part of maintenance. This inspection could occur during cleaning of the area behind the wall.

4.13 Wildlife and Fish

Affected Environment

Lands near the project area have a potential to attract a variety of fish and wildlife species due to the variety of habitats including aquatic, riparian, grassland, juniper savanna, woodland, and cliff habitats. Many mammals, birds, reptiles, amphibians, fish, and invertebrate species could potentially occur in the Rio Grande Gorge. Habitat conditions have been affected by vegetation modification through historic livestock grazing and conversion of riparian areas, habitat fragmentation by roads and developments, vehicle traffic along NM 68, recreation use of the Rio Grande, river modification with dams and diversion structures, and introduction of exotic animal and plant species. Nevertheless, much good fish and wildlife habitat remains in the gorge but little in the project area. The project area occurs in an upland area with little vegetation cover and numerous rock outcrops and tallus slopes. Common mammal species found in such habitat include coyote (*Canis latrans*), rock squirrel (*Spermophilus variegates*), deer mouse (*Peromyscus maniculatus*), desert cottontail (*Sylvilagus audubonni*), little brown myotis (*Myotis lucifagus*), and mule deer (*Odocoileus hemionus*). Common bird species found in such habitat include canyon wren (*Catherpes mexicanus*), common raven (*Corvus corax*), dark-eyed junco (*Junco hyemalis*), Say's phoebe (*Sayornis saya*), and white-crowned sparrow (*Zonotrichia leucophrys*). These bird species and their nests are protected by the Migratory Bird Treaty Act. Although aquatic habitats are absent, the nearby Rio Grande supports fish species such as the brown trout (*Salmo trutta*), fathead minnow (*Pimephales promelas*), longnose dace (*Rhinichthys cataractae*), rainbow trout (*Oncorhynchus mykiss*), and Rio Grande chub (*Gila pandora*). A variety of reptile and invertebrate species also occur in the general area.

Habitat conditions are poor at the project area. The project area is mostly rock material, which is unsuitable habitat for most species that occur in the area. Species adapted to rocky canyon environments such as the canyon wren, mice and small lizards may be present.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No impacts to fish or wildlife would occur.

Long-term Impacts

Current conditions would continue. No long-term fish or wildlife impacts are expected.

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

Noise and movement of construction activity will disturb wildlife near the project area. Construction activities will prevent use of the project area by wildlife. Any species utilizing rocky habitats, such as canyon wrens, mice, squirrels, and small lizards will be displaced during construction. Sediment and erosion control measures will be needed to prevent indirect impacts to fish habitat in the Rio Grande.

Long-term Impacts

The project area is receiving little wildlife use. Wildlife species, such as canyon wrens and small lizards, that inhabit rock habitats will be able to move into the project area after the completion of construction. The project area will continue to be low quality wildlife habitat due the absence of vegetation cover and water sources. The project area is not a known wildlife passage area. The structures are not expected to affect wildlife movements. Fish species in the Rio Grande will not be affected.

4.14 Threatened and Endangered Species

Affected Environment

Threatened and endangered species listed by the U.S. Fish and Wildlife Service (USFWS) and New Mexico Department of Fish and Game (NMDGF) are shown in Tables 4.4 and 4.5. A biological survey of the project area was conducted during 2004 (Marron and Associates, 2005). The bald eagle (*Haliaeetus leucocephalus*) is the only listed species known to occur in close proximity to the project area during the proposed construction period. It principally occurs in New Mexico as winter visitors although there are known nesting pairs in the state. The bald eagle is more likely to be found near rivers and reservoirs, but some winter in uplands where they feed on carrion. The species occurs casually to occasionally in summer and occurs almost statewide during winter migration. Their main wintering areas in New Mexico include the San Juan River, upper Rio Grande, upper and middle Pecos River, Canadian River, San Francisco River, Gila River, and Estancia Valley. Although this species is proposed for delisting, it remains listed by the USFWS as federal threatened, and it is also a state listed threatened species (NMDGF, 2004; USFWS, 1998). A bald eagle was observed along the Rio Grande near the project area in December 2004.

It should be noted that the Rio Grande from Otowi Bridge (south of Española) to Taos Junction Bridge was proposed by the USFWS (under 50 CFR Part 17) as critical habitat for the southwestern willow flycatcher on October 12, 2004 (USFWS, 2004). The project is located within this river reach and, in

some places, overlaps the proposed critical habitat that extends 300 feet laterally from each riverbank. However, the riparian habitat in these areas is unsuitable for the flycatcher because it lacks the dense understory required by this species. Although this designation of critical habitat is proposed, it has not yet been finalized by the USFWS and currently has no legal status. The project area occurs outside the proposed critical habitat.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No impacts to threatened and endangered species would occur.

**Table 4.4 Threatened and Endangered Animal Species
Listed in Rio Arriba and Taos Counties**

Species	Federal Status	State Status	BLM Status	Potential Effect
Invertebrates				
Cockerell's striate disk (snail) (<i>Discus shimckii cockerelli</i>)	SOC	S	S	No effect – Project area outside species' altitude range; occurs in terrestrial mountain habitats usually at elevations above 8400 feet in the Canadian Life Zone up to the treeline (Metcalf and Smartt, 1997).
New Mexico silverspot butterfly (<i>Speyera nakomis nitocris</i>)	SOC	--	--	No effect – No suitable habitat at project area; occurs in montane wetland habitats and prefers streamside wet meadows (Cary and Holland, 1992).
Sangre de Cristo peaclam (<i>Psidium sanguinichristi</i>)	SOC	T	S	No effect – No aquatic habitat at project area.
Fish				
Flathead chub (<i>Platygnathus gracilis</i>)	--	--	S	No effect – No aquatic habitat; occurs in moderate to strong current in rivers and large streams. Waters typically are highly turbid with shifting sand substrates in the Rio Grande drainage (Sublette et al., 1990).
Rio Grande cutthroat trout (<i>Oncorhynchus clarki virginalis</i>)	SOC	S	--	No effect – No aquatic habitat at project area; occurs in clear, cold water streams and lakes including Rio Grande tributaries upstream of the Rio Grande Gorge (Sublette et al., 1990).
Rio Grande silvery Minnow (<i>Hybognathus amarus</i>)	E	E	--	No effect – No aquatic habitat in project area; occurs in Rio Grande below Cochiti Dam (Sublette et al., 1968; USFWS, 1968). It has been extirpated from Rio Arriba County based on USFWS 2005 data.
Rio Grande sucker (<i>Catostomus plebius</i>)	SOC	--	--	No effect – No aquatic habitat at project area; occurs primarily in the Rio Grande basin. It prefers streams over gravel and cobble, and it rarely occurs in streams with heavy silt or organic detritus loads (NMDGF, 2004; Sublette, et al., 1990).

Roundtail chub (<i>Gila robusta</i>)	SOC	E	S	No effect – No suitable aquatic habitat in project area; occurs in pools and rapids of the Gila, San Francisco, San Juan, and Zuni rivers (Sublette et al., 1990).
Amphibians				
Mountain Toad (<i>Bufo boreas</i> complex} and mountain toad species complex	--	E	--	No effect – No suitable aquatic habitat at project area; occurs in beaver ponds, high elevation lakes, slow-moving streams, or low march areas (Degenhardt et al., 1996).
Jemez Mountain salamander (<i>Plethodon</i> <i>neomexicanus</i>)	SOC	T	S	No effect – No suitable habitat occur in the project area. This species is found in coniferous forest habitat under rocks or rotting logs (Degenhardt et al., 1996), which are not present in the project area.

Birds

American peregrine falcon (<i>Falco peregrinus anatum</i>)	SOC	T	--	No effect – Occurs in areas with rocky, steep cliffs, preferably near water, in habitats ranging from piñon-juniper, ponderosa pine, and mixed conifer forests. It nests on cliffs (USFWS, 1998). Falcons may occasionally fly-over the project area, and use cliff faces in nearby areas for nesting. The project will have no direct effect on these cliff faces, and construction would occur outside of the nesting season for this species.
Arctic peregrine falcon (<i>Falco peregrinus tundrius</i>)	SOC	--	--	
Baird's Sparrow (<i>Ammodramus bairdii</i>)	SOC	T	S	No effect – No suitable habitat at project area; prefers open grassland habitat, but also occurs in desert grasslands, prairies, and mountain meadows (Ligon, 1961; NMDGF, 2004).
Bald eagle (<i>Haliaeetus leucocephalus</i>)	T	T	--	No effect – Occurs in New Mexico as a winter visitor including the Rio Grande near the project area (USFWS, 1998). Daily monitoring will be conducted during construction after October 15.
Boreal Owl (<i>Aegolius funerus</i>)	--	T	--	No effect – No suitable habitat at project area; occurs in high elevation, subalpine and coniferous forest (NMDGF, 2004).
Ferruginous hawk (<i>Buteo regalis</i>)	--	--	S	No effect – No suitable habitat in project area; occurs in open fields, grasslands, and mesas (Ligon, 1961; NMDGF, 2004).
Gray vireo (<i>Vireo vicinior</i>)	--	T	--	No effect - The project area provides potential habitat for this species, but because of the proximity of the roadway, these areas are not ideal habitat. The gray vireo occurs in piñon-juniper habitat. It also occurs in oak scrub and open woods (Alden et al., 1999; NMDGF, 2004). No individuals were observed during the field survey. Since construction will occur outside the gray vireo nesting season, there will be no effect on this species.
Interior least tern (<i>Sterna antillarum athalassos</i>)	E	E	--	No effect – No suitable aquatic habitat in project area; occurs in nearly bare ground on alluvial islands or sandbars in wide shallow rivers (USFWS, 1968). Although this species could visit sandbars in the Rio Grande, the project will have no effect on these habitats, and construction will occur outside the tern's nesting season.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	--	--	S	No effect - occurs in open areas throughout New Mexico. It can be found in shrubby grasslands, deserts, and farmland (Ligon, 1961; NMDGF, 2004).
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	T	S	--	No effect – No suitable habitat at project area; occurs in mature montane forest and woodland, shady wooded canyons, and steep canyons away from human activity (NMDGF, 2004; USFWS, 1998).

Mountain Plover (<i>Charadrius montanus</i>)	SOC	S	--	No effect – No suitable habitat at project area; occurs and nests on arid short-grass and prairie habitats moderately disturbed by grazing ungulates (NMDGF, 2004).
Northern goshawk (<i>Accipiter gentilis</i>)	SOC	S	S	No effect – no suitable habitat at project area; occurs in forested mountains of New Mexico, usually at altitudes over 7000 feet. It can occur in a variety of forest types including white fir, ponderosa pine, Douglas fir, and riparian woodland (NMDGF, 2004).
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	E	E	--	No effect – No suitable habitat at project area; occurs in montane riparian habitat typically containing a cottonwood overstory and a shrub layer with wetlands or flowing streams or rivers (NMDGF, 2004; USFWS, 1998). The project area occurs outside the proposed critical habitat along the Rio Grande.
Western burrowing owl (<i>Athene cunicularia hypugaea</i>)	SOC	T	S	No effect – Could occur in the general area but no owls or burrows were observed in the project area; occurs on plains, treeless valleys, and mesas. It is also found in sagebrush, saltbush, greasewood, and creosote shrublands (Ligon, 1961; NMDGF, 2004). Construction will occur outside the owl's nesting season.
White-eared hummingbird (<i>Hylocharis leucotis borealis</i>)	--	T	--	No effect - The project area provides potential habitat for this species, but it is not believed to nest or regularly occur in the gorge. No individuals were observed during the field survey. The white-eared hummingbird occurs primarily in southwestern New Mexico with most records from Hidalgo County and the Animas Mountains. A few individuals have been recorded in the Sangre de Cristo Mountains. It prefers montane habitat with pine-oak woodland and adjacent riparian areas (NMDGF, 2004).
White-faced ibis (<i>Plegadis chihi</i>)	--	--	S	No effect – No suitable aquatic habitat at project area; occurs in shorelines and marshes associated with open water and in riparian habitats with cottonwoods (NMDGF, 2004). Although this species could visit shorelines of the nearby Rio Grande, the proposed project activities will occur outside of the nesting season for white-faced ibis, and there will be no direct effect on potential habitat for this species.
White-tailed ptarmigan (<i>Lagopus leucurus altripetens</i>)	--	E	--	No effect – No suitable habitat at project area; occurs in tundra and subalpine habitat primarily in the Sangre de Cristo Mountains (NMDGF, 2004).
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	C	--	--	No effect – no suitable habitat at project area; occurs below 7000 feet, usually in lowland deciduous woodlands, willow and alder thickets, second growth woods, deserted farmlands, and orchards. (Hughes, 1999; Ligon, 1961; NMDGF, 2004).
Mammals				
American marten (<i>Martes americana origenes</i>)	--	T	--	No effect – No suitable habitat is at project area; recorded in high altitude coniferous forest in the mountains of northern New Mexico (NMDGF, 2004).

Black-footed ferret (<i>Mustela nigripes</i>)	E	S	--	No effect – Extirpated in New Mexico except for captive population in Colfax County (NMDGF, 2004). No prairie dogs (the prey base for the ferret) were present in the project area.
Goat peak pika (<i>Ochotona principes nigrescens</i>)	SOC	S	S	No effect – No suitable habitat in project area; occurs in talus slides and boulder fields above 11,000 feet (Findley et al., 1975).
Myotis bats: • Big free-tailed bat (<i>Nyctinomops macrotis</i>) • Fringed myotis (<i>Myotis thysanoides thysanoides</i>) • Little brown myotis (<i>Myotis lucifugus carissima</i>) • Long-eared myotis (<i>Myotis evotis evotis</i>) • Long-legged myotis (<i>Myotis volans interior</i>) • Occult little brown myotis (<i>Myotis lucifugus occultus</i>) • Western small-footed myotis (<i>Myotis ciliolabrum melanorhinus</i>) • Yuma myotis (<i>Myotis yumanensis yumanensis</i>)	--	S	S	No effect – Buildings and cavities in rock faces near the project area provide potential roosting habitat, and flowing streams provide potential foraging habitat (Findley et al., 1975; Findley, 1987). All of the rock fissures and gaps between boulders were surveyed and there were no bats present. Bat droppings were found in a culvert under NM 68, but this culvert will not be impacted by project activities. Bats will not be present in the culvert during construction.
New Mexican meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	SOC	T	S	No effect – No suitable habitat at project area; occurs in near permanent streams in marshes, meadows, and riparian habitat and prefers areas with high soil moisture in a perennial grass and forb community (NMDGF, 2004). Although the New Mexican meadow jumping mouse could occur in wetlands areas adjacent to the Rio Grande, project activities will not affect these habitats.
Southwestern otter (<i>Lutra canadensis sonora</i>)	SOC	S	S	No effect – Records of otter from New Mexico during the 1900s are limited to one record in Grant County. <i>Lutra canadensis sonora</i> is believed to have once occurred in the Upper Rio Grande drainage (Armstrong, 1972; Findley et al., 1975).
Spotted bat (<i>Euderma maculatum</i>)	--	T	S	No effect - cavities in rock faces near the project area provide potential roosting habitat, and flowing streams provide potential foraging habitat (Findley et al., 1975; Findley, 1987). Project activities will not disturb any suitable roosting habitat and construction will not occur at night when the bats are active. Construction will occur in the fall when bats are not likely to be present or active.
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	SOC	--	S	No effect – Buildings and cavities in rock faces near the project area provide potential roosting habitat, and flowing streams provide potential foraging habitat (Findley et al., 1975; Findley, 1987). Project activities will not disturb buildings, cliff faces, or streams.

Codes: C – candidate, E – endangered, PT – proposed threatened, SOC – species of concern, S – State and BLM special status, and T – threatened

**Table 4.5 Threatened and Endangered Plant Species
Listed in Rio Arriba and Taos Counties**

Species	Federal Status	State Status	BLM Status	Potential Effect
Alpine larkspur (<i>Delphinium alpestre</i>)	--	SOC	--	No effect – Project area occurs outside the altitude range (11,500-13,000 feet) for this species.
Arboles milkvetch (<i>Astragalus oocalycis</i>)	--	SOC	--	No effect – No suitable habitat; grows on seleniferous clay soils such as those derived from the Mancos Formation.
Arizona willow (<i>Salix arizonica</i>)	SOC	SOC	--	No effect – No plants observed in project area; occurs in sagebrush, piñon-juniper, and Gambel oak thickets at 7000-8250 feet.
Chaco milkvetch (<i>Astragalus micromerius</i>)	--	SOC	--	No effect – No suitable habitat; grows on gypseous and limy sandstones.
Chama blazing star (<i>Mentzelia conspicua</i>)	--	SOC	--	No effect – No suitable habitat; grows on gray to red shales and clays of the Mancos and Chinle formations.
Pagosa bladderpod (<i>Lesquerella pruinosa</i>)	--	SOC	--	No effect – No suitable habitat; grows on soils derived from the Mancos Formation.
Pagosa phlox (<i>Phlox caryophylla</i>)	--	SOC	--	No effect – No plants observed in project area; grows in deep soils of open woodlands, slopes, and sagebrush communities.
Pecos fleabane (<i>Erigeron subglaber</i>)	--	SOC	--	No effect – Project area occurs outside the altitude range (10,000-11,000 feet) for this species.
Ripley milk-vetch (<i>Astragalus ripleyi</i>)	SOC	SOC	S	No effect – Project area occurs outside the altitude range (10,000-11,200 feet) for this species.
Sierra Blanca kittentails (<i>Besseyia oblongifolia</i>)	--	SOC	--	No effect – Project area occurs outside altitude range (11,000-12,000 feet) for this species.
Small-headed goldenweed (<i>Ericameria microcephala</i>)	--	SOC	--	No effect – Project area occurs outside the altitude range (8000-8500 feet).
Taos milkvetch (<i>Astragalus puniceus</i> var, <i>gertrudis</i>)	--	SOC	--	No effect – No plants observed in project area; occurs on dry banks and gravelly benches in piñon-juniper woodland.
Tufted sand verbena (<i>Abronia bigelovii</i>)	--	SOC	--	No effect – No suitable habitat; grows on hills and ridges of gypsum in the Toldito Formation.

Codes: C – candidate, E – endangered, PT – proposed threatened, SOC – species of concern, S – BLM special status, and T – threatened

Source: New Mexico Rare Plant Technical Council (2004)

Long-term Impacts

Current conditions would continue. No long-term threatened and endangered species impacts are expected.

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

Although bald eagle was the only listed species in Table 4.4 found in the project area, other species such as southwestern willow flycatcher (*Empidonax traillii extimus*), yellow-billed cuckoo (*Coccyzus americanus*), western burrowing owl (*Athene cunicularia hypugaea*), gray vireo (*Vireo vicinior*), New Mexico meadow jumping mouse (*Zapus hudsonius luteus*), and Taos milkvetch (*Astragalus puniceus* var. *gertrudis*) could have occurred in the general area. However, there was either no specific habitat for these species within the construction limits or these species would not likely be present during the proposed construction. Consequently, it was determined that the project would have no effect on them (Marron and Associates, 2004).

Noise and movement of construction activity may affect the bald eagle but not adversely affect this species. Construction is scheduled from September through November. Generally, bald eagles typically don't arrive until late October or November. Monitoring measures will be needed starting October 15 to ensure that construction activities do not affect the bald eagle. To avoid negative impacts to bald eagles, if an eagle is observed perching or roosting within 0.5 miles of the project area in the morning before project activity starts, or following breaks in project activity, the construction contractor will suspend all project activity until the eagle leaves of its own volition; however, if an eagle arrives during construction activities or if an eagle is beyond the 0.5 mile distance, construction need not be interrupted (USFWS Consultation #02-22-02-I-571). Construction activities would have no impact on other threatened and endangered species (see Tables 4.4 and 4.5).

Long-term Impacts

The project area does not provide suitable habitat for any threatened or endangered species. The project will have no long-term effects on any threatened or endangered species including the bald eagle.

4.15 Cultural Resources

Affected Environment

New Mexico has a diverse cultural history affected by Native American, Spanish, and American influences. The cultural history of the Northern and Middle Rio Grande Valley is typically divided into four periods: Paleoindian period (10,000-5500 BC), Archaic period (5500 BC - AD 400), Puebloan period (AD 400-1600), and Historic period (AD 1540-Present). The Paleoindian period consisted of mobile hunting and gathering period that depended on megafauna (including extinct forms of bison and mammoths) food sources as well as plant and small animal foods. During the Archaic period, mobile hunting continued, but there was an increased emphasis on plant food sources. The Puebloan period experienced greater dependence on agriculture and the establishment of communities consisting of adobe and masonry structures. The historic period in New Mexico dates to the Coronado's expedition of 1540-1542, which was followed by the establishment of Spanish settlements in the 1600s.

Class I and Class III cultural resource surveys were conducted in the project area (McEnany and Brown, 2004). Eight previously recorded archaeological sites occur within one mile of the project area. In addition, the Embudo Historic District occurs near MP 17.7 on the northwest side of NM 68. The district is listed on the National Register of Historic Places (NRHP) and the State Register of Cultural Properties (SRCP). The project area does not include these archaeological sites or the Embudo Historic District. No cultural resource sites were located in the project area.

Impacts Under All Alternatives

Construction Impacts

No cultural resources sites occur in the project area. No construction impacts are anticipated. If any previously undiscovered cultural resources are discovered during construction, the construction contractor will cease work at the affected area and contact the BLM Taos Field Office and NMDOT Environmental Section. BLM and NMDOT would then consult to determine if additional cultural resources investigations and SHPO consultation are required.

Long-term Impacts

No cultural resources sites occur in the project area. No long-term impacts would occur.

4.16 Climate and Air Quality

Affected Environment

The Rio Grande Gorge has a climate characterized by warm summers and cold winters. Climate data for Alcalde and Taos show that temperatures can range from around 90°F in July to less than 10°F in January (see Table 4.6). Precipitation is typically between 9 and 12 inches but can vary drastically from year to year. Substantial snowfall is also possible. The Rio Grande Gorge has its own microclimate that differs from surrounding areas. The gorge is shaded during the day from mid-morning to late afternoon and early evening. This can keep the gorge cooler than nearby areas, but the direct mid-day summer sun can be quite warm. At night, heavy cooler air can sink into the canyon from surrounding upland areas and result in cold nighttime temperatures. Icy road conditions can result during winter months and last until

mid-morning when sunlight finally reaches the roadway. The gorge is protected from winds except when wind direction is aligned with the northeast-southwest extending gorge.

Moisture directly affects the risk of rockfalls. Most rockfall events occur during periods of high rainfall, such as during the July-October months, when thunderstorms or intense rainfall events occur. Moisture in the soils help loosen rocks that can roll down the gorge slopes. The second most common period for rockfall is during snow melt in the winter months. Moist soils combined with alternating freezing and thawing conditions can loosen rocks resulting in rockfalls.

Table 4.6 Alcalde and Taos Climate Data

Variable	Alcalde	Taos
Average Maximum Temperature	68.2°F	63.3°F
Average Maximum July Temperature	89.3°F	85.6°F
Average Minimum Temperature	34.0°F	30.8°F
Average Minimum January Temperature	15.2°F	9.6°F
Average Total Precipitation	9.85 inches	12.31 inches
Months with Greater Than 1.0 Inches of Precipitation	July-October	May, July-October
Average Total Snowfall	10.0 inches	29.1 inches
Months with Greater Than 1.0 Inches of Snowfall	December-March	November-April

Source: Western Regional Climate Center (2004)

The Clean Air Act, as amended, established the National Ambient Air Quality Standards (NAAQS) for six air pollutants (ozone, airborne particulates, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead) to protect the public from exposure to dangerous levels of these pollutants (see Table 4.7). Primary standards have been adopted to protect public health, and secondary standards have been adopted to protect public welfare. States that failed to attain the NAAQS were required to submit State Implementation Plans (SIP) to address the problem. New Mexico has submitted a SIP to address non-attainment areas and has subsequently prepared necessary revisions as required by USEPA. Rio Arriba and Taos counties are designated as in attainment with the NAAQS (NMED, 2004). In the gorge, motor vehicles produce small amounts of emissions of carbon monoxide, nitrogen oxides, and can cause ozone formation. Sanding of roads during winter months can produce particulate matter. Winter wood burning by gorge residents produces small quantities of carbon monoxide. Because vehicle and wood burning emission sources are dispersed and produce small emissions quantities, USEPA or NMED have not identified any air quality problems in the gorge.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No construction impacts to air quality would occur.

Long-term Impacts

No long-term impacts to air quality would occur.

Table 4.7 National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon monoxide (CO) in parts per million (ppm)	1 hour	35 ppm	--
	8 hour	9 ppm	--
Nitrogen dioxide (NO ₂) in ppm	Annual	0.05 ppm	0.05 ppm
Particulate matter (PM ₁₀) in grams per cubic meter or or micrograms per cubic meter (µg/m ³)	24-hour	150 µg/m ³	150 µg/m ³
	Annual	50 g/m ³	0 µg/m ³
Ozone (O ₃) in ppm	1 hour	0.12 ppm	0.12 ppm
Sulfur dioxide (SO ₂) in ppm	3 hour	--	0.5 ppm
	24 hour	0.14 ppm	--
	Annual	0.03 ppm	--
Lead (Pb)	Quarter	1.5 µg/m ³	1.5 µg/m ³

Source: USEPA (2004)

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

Dust will be produced during construction. The construction contractor will develop dust control measures ensuring that NMDOT standards are met.

Long-term Impacts

No long-term impacts to air quality would occur.

4.17 Noise

Affected Environment

The relative loudness of a sound or noise is typically described in units of decibels (dB), a measure of sound pressure on a logarithmic scale. Traffic noise is normally discussed as a time-averaged noise level that occurs during a peak traffic period. Traffic noise is usually averaged over a one-hour period and is expressed as the equivalent noise levels (Leq). Human hearing is not equally sensitive to all sound frequencies. Therefore, an A-weighting filter is used to correlate physical noise levels with the frequency sensitivity of human hearing and the subjective response to noise. Thus, traffic noise conditions are generally discussed in terms of hourly average A-weighted noise levels in decibels, or Leq dB(A).

NMDOT noise policies and procedures are based on FHWA noise regulations, and are specified in the *New Mexico State Highway Commission Noise Abatement Policy* (CP 86 dated July 18, 2002) and *NMDOT Administrative Directive* (AD 236 dated May 1, 2002). According to NMDOT's noise policy, noise abatement must be considered when predicted traffic noise levels for a particular land use "approach" or exceed the noise level threshold defined for its activity category. Noise levels within one decibel of the abatement thresholds are considered to approach the threshold. Noise abatement must also be considered when the implementation of a roadway project results in a "substantial increase" over existing noise levels.

A 10-decibel increase is considered a substantial increase over existing noise levels. Table 4.8 summarizes the noise abatement thresholds defined by NMDOT's noise policy.

**Table 4.8 Noise Abatement Criteria
(Hourly A-Weighted Sound Level in Decibels [dBA])¹**

Activity Category	Leq(h)	Description of Activity Category
A	57 (Exterior)	Lands where serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purposes.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Category A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR 772

Sensitive receptors near the project area include area residences and recreation users. A few residences are located near the MP 19.37-19.39 segment of the project area. Little if any recreation use occurs near this project area. Recreation users are the principal sensitive receptors near the MP 27.29-27.85 segment. These include river rafters and boaters, people fishing, wildlife watchers, and visitors stopping to enjoy views. The principal noise source in the area is traffic along NM 68. Traffic is audible alongside NM 68, but vehicle traffic is less audible on the river.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No construction noise impacts would occur.

Long-term Impacts

No long-term noise impacts would occur.

¹ The relative loudness of a sound or noise is described in units of decibels (dB), a measure of sound pressure on a logarithmic scale. Traffic noise is averaged over peak traffic periods and expressed as an equivalent noise level (Leq). An A-weighting filter is also used to correlate physical noise levels with the frequency sensitivity of human hearing and the subjective response to noise. Thus, traffic noise conditions are generally discussed in terms of hourly average A-weighted noise levels in decibels, or Leq dB(A).

Direct Impacts Build Alternatives

Construction Impacts

Noise from construction vehicles and equipment would occur during from September through November 2005. This would keep noise impacts outside of the main rafting season during the spring and summer. Under NMDOT construction specifications, contractors are required to use noise suppression devices on equipment. Noise would be produced by the excavation, movement and removal of rock. Construction activities would be scheduled between 8:30 am and 4:30 pm to limit noise impacts on nearby residences in Embudo and Pilar.

Long-term Impacts

No long-term noise impacts are expected.

4.18 Farmland

Affected Environment

Agricultural fields and pastures occur in scattered areas along the Rio Grande Gorge. Small-scale agricultural production includes alfalfa, corn, and vegetables production as well as apple and peach orchards. Pockets of pastureland, used mainly for horses, occur within the gorge. Any conversion of prime farmland requires evaluation under the Farmland Protection Policy Act (7 USC 4201-4209) and consultation with the Natural Resources Conservation Service. No farmland or pastureland occurs in the project area

Direct Impacts of All Alternatives

Construction Impacts

No construction impacts to farmland would occur.

Long-term Impacts

No long-term impacts to farmland would occur.

4.19 Relocations and Easements

Affected Environment

Landowner ship in the Rio Grande Gorge consists mainly of private land and public land administered by the BLM. NM 68 occurs on NMDOT right-of-way. The MP 19.37-19.39 segment of the project area occurs on NMDOT right-of-way and private land. The MP 27.29-27.85 segment of the project area occurs on NMDOT right-of-way and BLM land.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No temporary relocations or temporary easements would be needed.

Long-term Impacts

An amendment to the current BLM right-of-way NMNM-88789 would be required. No long-term relocations or easements (including temporary easements) would be needed.

Direct Impacts of Build Alternatives

Construction Impacts

On the MP 19.37-19.39 segment of the project area, NMDOT would obtain a construction maintenance easement (CME) or temporary construction permit (TCP) for construction activities on private land. NMDOT would apply to BLM for an amendment to their current right-of-way NMNM-88789 under all alternatives except the No Action alternative. Any temporary work areas located outside the right-of-way would require a temporary use permit. No temporary relocations or easements would be needed. On the MP 27.29-27.85 segment of the project area (including portions of the pull-outs not on NMDOT right-of-way), NMDOT would obtain approval from the BLM by amending NMDOT's current right-of-way or applying for temporary work areas for construction activities on public land. No right-of-way acquisitions or relocations would occur. Access to properties will be maintained except for very brief intervals.

Long-term Impacts

An amendment to the current BLM right-of-way NMNM-88789 for the MP 27.29-27.85 segment would be required. On the MP 19.37-19.39 segment of the project area, NMDOT would obtain a construction maintenance easements (CME) placement of the rockfall systems on private lands. Property owners affected by right-of-way easements will be fairly compensated through the Uniform Relocation Assistance and Real Properties Acquisition Policies Act and other applicable legislation. Right-of-way will be further refined during final design of this project. No right-of-way acquisitions or relocations would occur.

4.20 Multi-Modal Transportation

Affected Environment

Vehicle traffic is the dominant transportation mode. Buses occasionally travel along the corridor. Occasionally pedestrians and bicyclists travel along NM 68, but such use is limited because of long distances between destinations, hilly terrain, and limited shoulder space on the roadway. Pedestrians commonly are walking near the pullouts at river overlook areas.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No impacts would occur to multi-modal transportation.

Long-term Impacts

Existing conditions would continue. Pedestrians, bicyclists, and buses would continue to be at risk for rockfall incidents along NM 68 segments adjacent to the project area.

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

Pedestrian and bicycle travel through the construction zone would be prohibited during construction. Pedestrians and bicyclists would need to seek alternate routes or other transportation modes. Bus travel would experience delays 15-30 minute delays when construction is occurring.

Long-term Impacts

Pedestrians, bicyclists, and buses would have a reduced risk for rockfall incidents along NM 68 segments adjacent to the project area.

4.21 Permit/Plan Applications or Requirements

Affected Environment

The BLM and NMDOT have prepared a Memorandum of Understanding for preparation of this EA, development of construction plans, and construction activities. Permits will be needed for construction activities under the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act.

Direct Impacts of No Build Alternative (No Action)

Construction Impacts

No permits or approvals would be needed.

Long-term Impacts

No permits or approvals would be needed.

Direct Impacts of Build Alternatives (Action Alternatives)

Construction Impacts

On the MP 27.29-27.85 segment of the project area, NMDOT would obtain approval from the BLM for all construction activities on public land. NMDOT would adhere to conditions contained within BLM

agreements. The construction contractor will obtain coverage under the USEPA's general construction permit of the NDPEs for the entire project area. The construction contractor will obtain required environmental clearances and permits for staging areas. Possible locations would be at Pilar (north of the visitor center), Rinconada Patrol Yard, or other location.

Long-term Impacts

On the MP 27.29-27.85 segment of the project area, NMDOT would obtain approval from the BLM for use of public land for the selected rockfall protection system. NMDOT would adhere to conditions contained within BLM agreements.

4.22 Utility Adjustments

Affected Environment

No utilities are known to occur in the project area. The rocky slopes conditions on the southeast side of NM 68 have prevented utility installation.

Direct Impacts of All Alternatives

Construction Impacts

No utility impacts are expected. Although not anticipated, if utility relocations and adjustments are made during construction or maintenance, they will be coordinated with distributors and users to ensure minimal interruption of service to the area. The construction contractor will ensure that utilities are off-line for as short a time as possible and that adjustments are not delayed. Contracts will require that contractors be familiar with federal, state, and local laws that affect the conduct of work.

Long-term Impacts

No utility impacts are expected.

4.23 Hazardous Substances

Affected Environment

The Hazardous Materials Transportation Act (regulations at 49 CFR 170-180) defines hazardous materials as substances or materials that when transported in commerce may create a risk to health, safety, and property. Additional hazardous substances are covered under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA at 42 USC 9601 et seq.), which includes hazardous substances identified under the Resource Conservation and Recovery Act, Clean Air Act, Clean Water Act, and Toxic Substances Control Act. In addition, the presence of petroleum products are considered, since hazardous materials or petroleum products present in the existing easement or project area are a serious concern to workers' health and safety, as well as potential cleanup liability. NMDOT procedures regarding assessment of properties and management of contamination are contained in the *Hazardous Waste Assessment Handbook* (NMDOT, 1999). NMDOT conducted an initial site assessment (ISA) for the project area. No hazardous substances or wastes were observed.

Direct Impacts of All Alternative

Construction Impacts

No construction impacts associated with hazardous materials sites would occur.

Long-term Impacts

No long-term impacts associated with hazardous materials sites would occur. The use of non-explosive methods, such as Bristar compound, will not result in the accumulation of hazardous substances in soils, surface water, or groundwater.

4.24 Secondary and Cumulative Impacts

Secondary impacts are defined as indirect effects that are caused by an action later in time or farther removed in distance but that are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Cumulative impacts are defined as the impact that results from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts also can result from individually minor but collectively significant actions taking place over a period of time.

Maintenance activities are proposed at the following locations:

- MP 15.575 – Remove rock at this section of fence. Repair and make adjustments to fence.
- MP 15.584 – Remove rock and adjust support rocks.
- MP 15.632 – Remove rocks around post foundation and realign post.
- MP 15.640 – Remove and replace post.
- MP 15.661 – Remove rock rubble.
- MP 17.71 – Remove rock rubble and large boulder.
- MP 18.561 – Replace retaining rope.
- MP 18.944. Remove rock and support ropes.

Table 4.9 shows effects of maintenance activities. Cultural resources and biological surveys were conducted at these areas. Approximately 3.0 acres of previously disturbed lands will be affected. Since the land is already used for a rockfall fence, maintenance activities will not change current land use. Maintenance will ensure that the rockfall fence continues to function properly and prevent rockfall crashes. In general, these activities involve removing rock and making minor adjustments to the fence. No excavation will occur. Additional future maintenance will be required between MP 15.5 and MP 28.0 to ensure the integrity of the rockfall protection systems.

BLM and NMDOT propose to work on other project along NM 68. Facility improvements are proposed in *Rio Grande Corridor Final Plan* (BLM, 2000) at Quartzite, Rio Grand Gorge Visitor Center, Souse Hole, County Line Area, and other sites. The anticipated effects are shown in Table 4.10.

Table 4.9 Effects of Maintenance Activities

Resource	Maintenance Impacts	Long-term Impacts
Temporary Disturbance	3.0 acres disturbed at eight locations	These previously disturbed areas would remain disturbed because of the rock fall fence
Maintenance Duration	45 days	None
Maintenance Schedule	July – September 2005	New areas would require maintenance in future years.
Rockfall Protection	At the completion of maintenance, rockfall fences will operate up to standard	Periodic maintenance would be needed to remove rocks, repair fence, and adjust ropes in order to keep fences effectiveness in catching rocks.
Land Impacts	3.0 acres on public and private land	Land would continue to be used for rockfall fence through foreseeable future.
Community Impacts	Noise from maintenance may be heard and observed from nearby residences. Maintenance will not affect travel on NM 68.	Maintenance will ensure that fence prevents rockfalls and protects the safety of travelers on NM 68.
Visual Resources	Minor disturbance would be visible during maintenance activities.	Since a fence is already present, little change from current condition.
Scenic River and ACEC	Brief disturbance would occur during maintenance activities.	The fences would continue to meet the standards for the Rio Grande Scenic River segment and Lower Gorge ACEC.
Recreation Impacts	Maintenance activities may be periodically heard and observed by recreation users. Maintenance activities will not effect access to river or travel along NM 68.	No change from current condition.
Socioeconomics	Travel to local businesses and festivals will not be affected. No delays expected along NM 68.	No effect on local businesses including tourism, local retailers, river rafting and boating. No low income or minority incomes will be affected. Periodic maintenances will ensure that fences limit rockfall events and resulting property damage and loss of life.
Soils and Vegetation	3 acres of temporary disturbance	Vegetation cover will fill in where soils are present. Rock areas will remain clear of vegetation.
Water	If it rains during maintenance activities, some sediment transport may occur.	Little change in sediment transport over current condition.
Wildlife and Fish	Occasional wildlife disturbance would occur.	Areas will continue to provide low quality wildlife habitat after construction.
Threatened and Endangered Species	No effect	
Cultural Resources	No effect	
Air quality	Small quantities of dust produced during maintenance at times, but no dust produced from most maintenance activities.	No effect
Noise	Some noise produced by construction equipment	No effect
Farmland	No effect	
Relocations and Easements	Maintenance work will occur on existing NMDOT easements	NMDOT will keep easements in effect for rockfall fence on private and public lands.

Additional environmental analysis would be required for these projects including preparation of NEPA documentation, cultural resource surveys, biological surveys, and visual resource analysis. In general, the proposed improvements should provide for improved recreation use of the Rio Grande Gorge with

reduced soil erosion from parking area improvements and better groundwater quality from installation of improved restroom facilities.

Table 4.10 Potential Cumulative Effects of Proposed Activities Near Project Area

Resource/ Issue	Quartzite	Gorge Visitor Center	Souse Hole	County Line Area	Other Sites
Project Description	Raise beach level, improve traffic flow with signs and barriers, and install a pay / emergency telephone	Construct parking area improvements	Build a permanent rest room and provide more parking	Build permanent rest rooms, improve access and parking, install a pay / emergency telephone, install signs and barriers for traffic management, and construct landscaping	Provide portable or vault toilets as needed, develop safe access points for sightseeing and parking, and improve trail access to the river
Land Impacts	Affect 5-10 acres with deposition of fill, and small excavations	Affect 2-5 acres of previously disturbed land with regrading and covering with hard surfaces	Affect 2-5 acres with land clearing, excavation, and regrading	Affect 2-5 acres of previously disturbed land with excavation and regarding	Affect 5-10 acres with land clearing, excavation, and regrading
Community Impacts	Short-term construction impacts to Pilar; would benefit local economies by providing an improved recreation facility	Short-term construction impacts to Pilar; would benefit local economies by providing an improved visitor facility	Short term construction impacts; would benefit local economies by providing improved recreation facilities that help attract visitors to the Rio Grande Gorge area		
Visual Resources	Improvements would result in slight modifications to visual resources. Proposed improvements occur in areas where man-made structures and disturbance are present.				
Scenic River and ACEC	Improvements would conform to management objects and standards for Scenic River and ACEC – impacts primarily land disturbance, addition of structures, and slight modification of visual resources				
Recreation Impacts	Improvements would provide better facilities for recreation users and encourage continued recreation use of the Rio Grande Gorge.				
Socioeconomics	Improvements would benefit local economies by providing improved recreation facilities that help attract visitors to the Rio Grande Gorge area				
Soils and Vegetation	Parking lot improvements would reduce soil erosion; some vegetation would be cleared.				
Water	Parking improvements would reduce sediment transport.		Rest room improvements would improve groundwater quality; parking improvement would reduce sediment transport.		Vault toilets would improve groundwater quality; parking improvement would reduce sediment transport.
Wildlife and Fish	Temporary disturbance to wildlife would occur during construction. Presence of people near river would continue to disturb wildlife in vicinity of fishes. Improvements that reduce sediment transport and improve groundwater quality should indirectly benefit fish populations.				

Threatened and Endangered Species	Biological surveys would be needed to determine level of impact. Construction scheduling would need to consider impacts to bald eagle, southwestern willow flycatcher, and other protected species that occur in riparian areas along the river. The need for monitoring should be evaluated. Improvements that reduce sediment transport and improve groundwater quality should indirectly benefit protected fish species.
Cultural Resources	Cultural resource surveys would be conducted to evaluate impacts to archaeological and historic resources
Air quality	Construction dust would be a short-term impact. Low levels of vehicle emissions expected in parking areas but not expected to exceed NAAQS under the Clean Air Act.
Noise	Short-term construction noise would be produced. Vehicles would produce noise in parking areas.
Farmland	No impacts to farmland.
Relocations and Easements	Improvements would occur on BLM public land and NMDOT right-of-way. No relocations or easements on private land would be required.

During public involvement meetings, several members of the public mentioned the need to start looking at another new route as an alternate to NM 68. Local residents have expressed concerns about increasing traffic along NM 68. NMDOT proposed to conduct a corridor study to evaluate the existing NM 68 corridor and alternate routes in order to improve traffic flow and safety between Española and Taos.

4.25 Irreversible and Irretrievable Commitment of Resources to the Proposed Action

Implementation of the NM 68 Rockfall Project involves a commitment of a range of natural, physical, human, and fiscal resources. Undeveloped land within the project area will be committed for use as a roadway and associated drainage facilities. This use will forego other uses in the foreseeable future, such as leaving this area along the main corridor of the project area undeveloped or using this area for other uses.

Fossil fuels, labor, and construction materials will be expended in project construction. Labor and natural resources will be used in the fabrication and preparation of construction materials. These materials are generally not retrievable; however, they are not in short supply, and their use will not have an adverse effect on continued availability of these resources. Construction will also require a substantial one-time expenditure of public funds, which are not retrievable.

The installation of rockfall fences, slope mesh, or concrete barriers would result in a permanent modification of visual resources. These structures will likely remain in place for the foreseeable future. Continued use of NM 68 will require the continued use of rockfall protection systems to keep rocks off the roadway.

4.26 Relation Between Local Short-term use of the Human Environment and Long-term Productivity

Overall, the rockfall protection systems proposed under this project are needed to keep rocks off of NM 68 and ensure safe travel for motorists. The short-term impacts and use of resources by the proposed project are consistent with the maintenance and enhancement of long-term productivity.

4.27 Conclusions of the Environmental Assessment

The preliminary engineering and environmental investigations conducted thus far for this project have not disclosed any significant impacts on the quality of the natural or human environment except for skylining of the rockfall fence on Alternatives A and B. Skylining would not meet the VRM management

objectives for this area. Alternative A-1 is recommended as the preferred alternative because it reduces skylining while providing an optimal level of safety effectiveness. The project is currently listed in the State Transportation Improvement Program (STIP). Construction is proposed to occur by roadway segments. Once a draft EA has been approved by the BLM and an EA for public circulation has been approved for circulation by the FHWA, a public hearing will be held. At the end of the 30-day comment period, a revised BLM EA will be prepared. If no significant environmental impacts are identified, a FONSI request will be prepared and submitted to BLM and FHWA. BLM and FHWA would then issue separate FONSI decisions meeting the requirements of their respective guiding agency legislation and regulations. The revised BLM EA and FONSI decision documentation will address any concerns raised during the circulation of the EA, during the public hearing comment period, or regarding coordination of other aspects of the project with appropriate agencies. It is anticipated that the FONSI decision documentation will authorize final design of the NM 68 Rockfall Project.

5.0 Environmental Commitments

Communities / Land Use, Recreation, and Socioeconomics (Sections 4.2, 4.6, and 4.7)

Most community, recreation, and socioeconomic impacts are expected to occur during construction. NMDOT will use a 90-workday construction schedule starting in September to minimize impacts on rafting and boating use on the Rio Grande. This construction schedule will still affect fall tourism activities and travelers to area destinations, such as festivals in Taos. To minimize these impacts, NMDOT will:

1. Provide construction information through radio spots and on their web site with a link to the Taos Chamber of Commerce web site.
2. Schedule construction that affects traffic flow to occur between 8:30 am and 4:30 pm on weekdays. Weekend construction will be avoided.
3. Use efficient detours and variable message board signs to minimize traveler delays due to construction activities.
4. Access to properties will be maintained except for very brief intervals.

Visual Resources (Section 4.4) NMDOT will select construction materials to minimize their impact on views in the gorge. Rust colored posts will be used on the rockfall fence. Slope mesh will be colored to blend with the slope. During construction, NMDOT and BLM will coordinate regarding the placement of rockfall fence to reduce skylining. The rockfall fence will be located to reduce skylining by 80% from Key Observation Points (KOP) 2 and by 50% at KOP 5 (improvement over Alternative A, see visual simulations in Appendix B) where people stop to enjoy views. No skylining occurs at KOP 4 under Alternatives A or A-1. Skylining will be reduced by 20% along the remainder of the project area where the views are observed by individuals in moving vehicles. During construction, the option of reducing the fence height from 8-feet to 6-feet near KOP 5 will be evaluated to reduce visual impacts. The 6-foot fence option will be approved by an NMDOT Geotechnical Designer under the condition that safety is not compromised. Field verification for skylining will include having workers stand on the ridge with survey poles to verify fence height/location and make adjustments. NMDOT will use a painted concrete wall barrier. The barrier will be colored tan or brown to blend with the landscape. BLM will approve the color of the concrete wall barrier in the field during construction.

Protected Areas: Scenic River and ACEC (Section 4.5) The commitments in this chapter will ensure that impacts to the Rio Grande and Lower Gorge ACEC are minimized. BLM and NMDOT will continue to communicate regularly during final design and construction phases to ensure that commitments are fulfilled.

Soils and Water (Sections 4.9 and 4.10) Construction activities will conform to NMDOT standards for highway construction (NMDOT, 2000) and additional standards pertaining to rockfall protection systems. Prior to the initiation of construction, the construction contractor will prepare a stormwater pollution prevention plan (SWPPP) that identifies best management practices (BMPs) to minimize soil erosion and transport of sediment and contaminants. In addition, a Temporary Erosion and Sediment Control Plan (TESCP) will be prepared during final design. The TESCP is a set of plan sheets that show the location, type, and length of temporary measures, off-site flows, discharge locations, and flow paths. As part of the SWPPP, the construction contractor will file a Notice of Intent (NOI) with the U.S. Environmental Protection Agency (USEPA) to obtain coverage under a general construction activity permit under the NPDES. As part of this NPDES permit, the construction contractor will prepare a SWPPP that identifies BMPs, such as the use of silt fences, hay bales and catchment basins, to minimize soil erosion and transport of sediment and contaminants. At a minimum, BMPs include good

housekeeping, preventative maintenance, visual inspections, spill-prevention response, employee training, record keeping, and reporting. The project will have appropriate temporary and permanent erosion/sediment control measures to comply with NPDES permit requirements. At the completion of construction, the construction contractor will file a Notice of Termination (NOT) with the USEPA.

Vegetation (Section 4.12) NMDOT will conduct a periodic inspection of the wall barrier for noxious weeds as part of maintenance. This inspection could occur during cleaning of the area behind the wall. The detour area at the Roadside Rest Area will remain paved after the completion of construction and serve as permanent pull-out areas for Rio Grande Gorge visitors. After construction, the construction contractor will remove asphalt at the Albert's Falls pull-out, and scarify and revegetate disturbed areas with native species. Temporary disturbance from maintenance activities would affect 1.5 acres under Alternatives A, B, and C.

Threatened and Endangered Species (Section 4.14) NMDOT and BLM in consultation will develop and conduct a monitoring program for bald eagles. The monitoring program will ensure that construction activities have no effect on bald eagles roosting near the project area. The monitoring program will start after October 15 when bald eagles can potentially occur along the Rio Grande. The USFWS guidance regarding daily bald eagle monitoring during construction is as follows:

If an eagle is present within 0.5 miles upstream or downstream of the construction work in the morning before project activity starts, or following breaks in project activity, the contractor would be required to suspend all activity until the bird leaves of its own volition, or a project biologist, in consultation with USFWS, determines that the potential for harassment is minimal. In other words, surveys (0.5 miles upstream and downstream) for presence/absence of eagles must be done before work commences in the morning, and again after a work break during the day, in case eagle have settled in during the break period.

Cultural Resources (Section 4.15) If any previously undiscovered cultural resources (such as stone flakes, ceramics, petroglyphs, or prehistoric/historic structures) are discovered during construction, the construction contractor will cease work at the affected area and contact the NMDOT Environmental Section who will then consult with the BLM and SHPO at the New Mexico Historic Preservation Division. The SHPO will determine if additional cultural resource investigations and SHPO consultation are required.

Noise (Section 4.17) Construction will occur between 8:30 am and 4:30 pm, which will eliminate night-time noise impacts for residences near the project area.

Relocations and Easements (Section 4.19) NMDOT will amend the current agreement for BLM right-of-way NMNM-88789 at the MP 27.29-27.85 segment. NMDOT will obtain a construction maintenance easement (CME) or temporary construction permit (TCP) for construction activities on private land at segment MP 19.37-19.39. Affected property owners will be fairly compensated through the Uniform Relocation Assistance and Real Properties Acquisition Policies Act and other applicable legislation.

Hazardous Substances (Section 4.20) The construction contractor will be responsible for managing hazardous substances in compliance with federal and state laws to ensure that no contamination occurs. Solid waste, consisting mainly of construction debris, will be generated during construction. All such wastes will be removed from the construction zone as soon as it is practical and will be managed in

accordance with New Mexico's Solid Waste Act. If evidence of soil or groundwater contamination is identified during construction, work will stop immediately at the affected area, and the construction contractor will contact the NMDOT Environmental Geology Section and BLM for instructions on how to proceed.

Permit/Plan Applications or Requirements (Section 4.21) The construction contractor will obtain required environmental clearances and permits for staging areas. Possible locations would be at Pilar (north of the visitor center), Rinconada Patrol Yard, or other location.

Secondary and Cumulative Impacts (Section 4.24) Maintenance activities will not require any mitigation activities. BLM and NMDOT will conduct additional environmental investigations for facility improvements proposed along NM 68. These improvements are expected to require the preparation of a categorical exclusion or EA.

6.0 Public Involvement and Agency Coordination

6.1 Public Involvement and Local Coordination

Public involvement was obtained through a series of public involvement events including two public meetings. The meetings were used to obtain public input on the purpose and need for the project, important issues to be considered, and development and evaluation of alternatives.

July 20, 2004 Public Meeting was held at the Sagebrush Inn in Taos. Seven stakeholders attended the meeting. BLM and NMDOT representatives presented information on the environmental process, public involvement, BLM process and decision space, geology of the gorge and slope stability, and rockfall protection devices under consideration. Stakeholders commented on a variety of issues including their experiences with rockfall events, construction scheduling and detours, visual impacts, and vegetation impacts.

August 25, 2004 Stakeholder Meeting was held at the BLM Rio Grande Gorge Visitor Center in Pilar. Eleven stakeholders attended the meeting. BLM and NMDOT representatives and stakeholders discussed the project, identified issues, and considered options for developing plans. Stakeholders commented on flooding, rockfall, advantages of different rockfall devices, construction scheduling and detours, local community impacts, project need, speed limits, police patrols, and need to keep the public informed.

September 29, 2004 Stakeholder Meeting was held at the Taos BLM Field Office in Taos. Four stakeholders attended the meeting. BLM and NMDOT representatives discussed visual impacts, alternatives, and other issues. Stakeholders commented on construction schedule, effect of construction on Taos festivals and daily commuters, need to keep the public informed thorough variable message boards and web sites, important visual characteristics of the Rio Grande Gorge, location of best views, and preferred rockfall devices that minimize visual impact,

December 1, 2004 Stakeholder Meeting was held at the BLM Rio Grande Gorge Visitor Center in Pilar. Three stakeholders attended the meeting. BLM and NMDOT representatives discussed the proposed alternatives and visual analysis with stakeholders. Stakeholders commented on construction scheduling, effects of construction on fall festivals in Taos, need to keep the public informed of construction activities through variable message boards and web sites, slope mesh, preference for rust colored fences, visibility of fence from residences, affect on trees, need to give priority to safety, and development of a corridor study that would look at an alternate route for NM 68.

December 15, 2004 Public Meeting was held at the Sagebrush Inn in Taos. Eight stakeholders attended the meeting. BLM and NMDOT representatives presented information on the proposed project, alternatives, rockfall geology, technical aspects of rockfall protection systems, EA process, and BLM decision space. Stakeholders commented on fence maintenance and installation, project costs, possibility of a rockfall warning system, construction impacts on Taos fall festivals, slope mesh, and the need to develop a corridor study and consider an alternate route to NM 68.

6.2 Agency Coordination

BLM and NMDOT worked closely in the preparation of this EA. Monthly project team meetings were held between the agencies. As part of the NEPA process, the agencies followed both BLM and FHWA guidelines in the preparation of the EA to ensure that the project met the legal requirements of both agencies. BLM follows guidelines in FLPMA and their NEPA Handbook. With respect to this project

area, the BLM is follows the *Rio Grande Final Corridor Plan*. NMDOT follows FHWA guidelines including FHWA Technical Advisory T 6640.8A, FHWA regulations at 23 CFR 771 and 772,

Written correspondence was sent to federal, state, and local agencies (see Appendix A). Agencies contacted include the Rio Arriba County, Town of Taos, Taos County, New Mexico Department of Game and Fish, New Mexico Environment Department, New Mexico Historic Preservation Division, New Mexico State Police, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

6.3 Issues identified During Public Involvement and Agency Coordination

The need to balance safety with protecting the visual integrity and ensuring continued recreational use of the Rio Grande Gorge was a central issue during public involvement and agency coordination. Several stakeholders mentioned the importance of preventing rocks falling onto NM 68. A few stakeholders either witnessed or were involved in crashes caused by falling rocks. Stakeholders also recognize the importance of protecting the views and related resources values of the Rio Grande Gorge. The area receives many visitors who are sightseeing, fishing, river rafting, or just passing through to other destinations. Several stakeholders stressed the importance of using rust-colored posts, earth-colored concrete barriers, and other materials designed to blend with the landscape. Other issues identified by the public included:

- **Community and economic issues:** need to work with the Taos business community; consider impacts on summer rafters and tourists in the area; consider impacts to local fall arts and crafts festivals in Gorge communities; and consider impacts to travelers going to fall festivals in Taos. The business community is concerned that anticipated construction delays will cause visitors to change there plans and not visit local Gorge communities and Taos.
- **Effectiveness of rockfall systems:** rockfall is greatest during summer monsoons and spring thaws; evaluate cost effectiveness of rockfall systems; determine if fences are better than netting; and consider moving the roadway to another corridor.
- **Natural environment:** consider impacts to vegetation and trees; eventually may need to place rocks in the river to replace rocks captured by the rockfall system; and visual appearance of gorge is important.
- **Traffic safety:** unsafe driving is a problem along NM 68 due to the high speed of traffic on NM 68 and the lack of speed enforcement. Many crashes occur in Pilar, most because of speeding.

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